# EXPERT REPORT OF FRANK J. CHALOUPKA
June 3, 2005

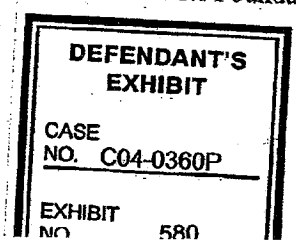
1. I am a Professor in the College of Business Administration's Department of Economics and a Professor in the School of Public Health's Division of Health Policy and Administration at the University of Illinois at Chicago. I am the Director of the University's Health Policy Center, a research center within the UIC Institute for Health Research and Policy. I am also the Director of ImpacTeen: A Policy Research Partnership to Reduce Youth Substance Use and Co-Director of the International Tobacco Evidence Network, project based in the Health Policy Center at the University of Illinois at Chicago. In addition, I am an Affiliate Faculty Member of the University of Illinois' Institute for Government and Public Affairs and I was awarded the University of Illinois at Chicago's University Scholar Award in 1996. A copy of my curriculum vitae is attached as Exhibit 1.

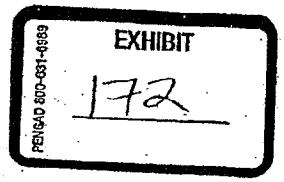
2. I am a Research Associate in the Health Economics and Children's Programs at the National Bureau of Economic Research. I am a member of the Centers for Disease Control and Prevention's Alcohol-Related Disease Impact (ARDI) Expert Working Group and the Chair of the ARDI Health Economics Expert Working Group. I am a member of the Alcohol Prevention Planning Committee for the National Institute on Alcohol Abuse and Alcoholism's Leadership to Keep Children Alcohol Free Initiative and a member of the consultation team for developing "Reducing Alcohol Related Problems" for inclusion in *Guide to Community Preventive Services* for the U.S. Public Health Service. I am a member of the Centers for Disease Control and Prevention's Healthy People 2010 Tobacco Work Group, a member of the Illinois State Governor's Tobacco Prevention Advisory Group, a senior consultant to the Robert Wood Johnson Foundation's Research Network on the Etiology of Tobacco Dependence, and a member of the American Lung Association's National Action Panel on Tobacco. I am also the Associate Editor for Economics for *Tobacco Control: An International Journal*, an Action Editor for *Nicotine & Tobacco Research*, and a member of the Editorial Boards for *Contemporary Economic Policy* and *American Journal of Public Health*.

3. My research interests include: 1) the impact of prices on alcohol, tobacco and illicit drug use and related outcomes; 2) the impact of substance control policies and environmental factors on alcohol, tobacco, and other drug use, and outcomes related to these behaviors; 3) the economics of tobacco use and tobacco control policies, and 4) the impact of prices, availability, and other environmental influences on healthy eating, physical activity, and obesity. My teaching at the undergraduate and graduate levels has included courses in the area of microeconomics, health economics, industrial organization, econometrics, and public policy issues.

4. I have extensive experience through my professional work, funded research activities, and consulting relationships with a wide variety of organizations. My research has been funded by the National Cancer Institute, the National Institute on Alcohol Abuse and Alcoholism, the National Institute on Drug Abuse, the Centers for Disease Control and Prevention, the Robert Wood Johnson Foundation, the Rockefeller Foundation, the





United States Department of Agriculture, the American Cancer Society, the Illinois Department of Public Health, and others. I have consulted for a variety of public, private, and non-profit organizations, including the Federal Trade Commission, the World Bank, the World Health Organization, the Environmental Protection Agency, Ireland's Office of Tobacco Control, the Centers for Disease Control and Prevention's Office on Smoking and Health, the National Center for the Advancement of Prevention, the National Association of Attorneys General, the Robert Wood Johnson Foundation, the American Cancer Society, the Addiction Research Foundation, the National Center for Tobacco Free Kids, SmithKline Beacham and Glaxo-SmithKline Pharmaceutical Companies, and others.

5. I have written well over 100 articles, book chapters or sections, reports, and other publications focusing on the economic analysis of substance use and abuse, including extensive research on the economics of alcohol, tobacco, and illicit drug use, related outcomes, and control policies. Much of this research has focused on the impact of prices on substance use and its consequences, with more recent research expanding to focus on healthy eating, physical activity, and obesity. Similarly, much of my research has focused on youth and young adult alcohol, tobacco, and other drug use. Nearly all of the research I have conducted over the past two decades has implications for public policy. My curriculum vita includes a list of publications I have authored or coauthored.

6. I have provided testimony before the United States Congress and other governmental bodies, including testimony before: the United States Senate Judiciary Committee's Subcommittee on Antitrust, Business Rights, and Competition; the United States House Committee on Ways and Means; the United States Interagency Committee on Smoking and Health and its Subcommittee on Cessation; the Rhode Island Senate Finance Committee; and the Massachusetts Legislature. I have conducted briefings on various issues for federal and state legislators and their staffs, as well as policymakers in a number of countries, including Cambodia, Ireland, Malaysia, Mexico, Thailand, Venezuela, and Vietnam.

7. I have provided expert testimony in several legal proceedings, including. I provided an expert report, was deposed, and testified in trial on behalf of defendants in *Santa Fe Natural Tobacco Co., Inc. v. Eliot Spitzer* and *Brown & Williamson et al., v. George E. Pataki*. On behalf of defendants, I provided an expert report in *Swedenburg, et al. v. Kelly, et al.* On behalf of defendants, I provided an expert report, was deposed, and testified in trial in *TFWS, Inc. v. William Schaefer, et al.* On behalf of defendants, I provided a declaration in *Freedom Holdings, Inc., v. Eliot Spitzer*. On behalf of plaintiff, I provided an expert report, was deposed, and testified in trial in *United States of America v. Philip Morris USA Inc. et al.*

8. My rate for the time spent rendering an expert opinion in this case, as an expert on issues related to the impact of alcohol control policies and alcoholic beverage prices on alcohol use, abuse, and related consequences, is $200 per hour plus expenses for background research, and $500 per hour plus expenses for time spent in depositions and testifying.

9. This matter is continuing and my research and other work on this matter are ongoing. As a result, I may render additional opinions based on my continuing review of relevant materials and the testimony of others. I reserve the right to revise and augment my opinions as my work on this matter continues.

## SUMMARY OF OPINIONS

10. My principal opinions, as of the date that I filed this report, are as follows:

11. The Washington statutes and regulations at issue in this case – which include: prohibitions on the provision of quantity discounts, gifts, rebates, special services and more by distributors to retailers; requirements that beer and wine prices distributors charge to retailers must be at least ten percent above the distributors' acquisition cost; the requirements that beer and wine distributors "post" these prices with the Washington State Liquor Control Board and "hold" these prices for one month; requirements that retailers pay cash for beer and wine at the time of delivery; and requirements that beer and wine be delivered directly from distributors to retailers' licensed outlets or directly to the retailer at the distributors' outlet, with the delivered prices the same for both – result in retail prices for beer and wine that are higher than they would be in the absence of these policies.

12. The higher alcoholic beverage prices that result from these policies are effective in reducing alcohol use, including heavy and excessive drinking, among adults in Washington. Drinking among youth, who are at relatively high risk for alcohol-related consequences, is particularly responsive to alcoholic beverage prices. Conversely, the reductions in the prices of alcoholic beverages that would result from the elimination of these policies would lead to increased drinking, including underage drinking, in Washington.

13. Alcohol use and abuse results in a number of health and social consequences, including traffic crashes, violence, liver cirrhosis, a number of cancers, and more. As a result, the economic costs of alcohol abuse are substantial. Higher alcoholic beverage prices are very effective in reducing the health, social and economic consequences of alcohol use and abuse. In contrast, reductions in the prices of alcoholic beverages will lead to increases in the health, social and economic consequences of alcohol use and abuse.

14. The policies at issue in this case are one part of a comprehensive set of statutes, regulations, and programmatic activities employed in Washington to reduce excessive drinking and its consequences. Together, these policies have been effective in promoting moderate drinking and in reducing the consequences of alcohol use and abuse in Washington.

15. Analyses of changes in policies similar to (but a subset of) those at issue in this case that took place in Nebraska and Delaware indicate that the removal of quantity discount bans (in both states) and price posting (in Nebraska) led to significant increases in alcohol consumption in both states. The impact of eliminating the Washington policies at issue

on alcohol consumption in Washington would almost certainly be larger than the observed effects in Nebraska and Delaware given that the Washington policies go beyond those in the other states.

## EFFECT OF POLICIES ON THE PRICES OF ALCOHOLIC BEVERAGES

16. Several provisions of Washington's laws and regulations applying to beer and wine are at issue in this case. These policies include: prohibitions on the provision of quantity discounts, gifts, rebates, special services and more by distributors to retailers (hereafter referred to generally as the "quantity discount prohibitions"); requirements that the prices distributor charge retailers for beer and wine must be at least ten percent above the distributors' acquisition cost (hereafter the "minimum markup" provisions); requirements that beer and wine distributors "post" the prices that they charge retailers for their products with the Washington State Liquor Control Board (WSLCB) (which are then posted on a WSLCB website) and "hold" these prices for one month (hereafter referred to as the "post and hold" provisions); requirements that retailers pay cash for beer and wine at the time of delivery (hereafter referred to as the "cash payment" provision); and requirements that beer and wine be delivered directly from distributors to retailers' licensed outlets or directly to the retailer at the distributors' outlet, with the delivered prices the same for both (hereafter referred to as the "delivery" provisions).

17. These policies have been adopted and implemented as part of the "three tier system" adopted by the state following the repeal of Prohibition by the 21st Amendment to the U.S. Constitution in 1933. For example, one of the challenged provisions (RCW 66.28.180) describes the intent of the statute:

> This section is enacted, pursuant to the authority of this state under the twenty-first amendment to the United States Constitution to promote the public's interest in fostering the orderly and responsible distribution of malt beverages and wine towards effective control of consumption; to promote the fair and efficient three-tier system of distribution of such beverages; and to confirm existing board rules as the clear expression of state policy to regulate the manner of selling and pricing of wine and malt beverages by licensed suppliers and distributors. (RCW 66.28.180, effective January 1, 2005; paragraph 1).

Similar language is contained in other relevant statutes.

18. The 21st amendment gave states the authority to regulate the importation and distribution of alcoholic beverages within their borders, including the ability to regulate various aspects of sales by distributors to retailers. Most states, including Washington, have had some form of this system in place since the 1930s. A recent Supreme Court decision confirms this authority; writing for the majority, Justice Kennedy states:

"The Twenty-first Amendment grants the States virtually complete control over whether to permit importation or sale of liquor and how to structure the liquor distribution system." *Midcal, supra*, at 110. A State which chooses to ban the sale and consumption of alcohol altogether could bar its importation; and, as our history shows, it would have to do so to make its laws effective. States may also assume direct control of liquor distribution through state-run outlets or funnel sales through the three-tier system. We have previously recognized that the three-tier system itself is "unquestionably legitimate." *North Dakota* v. *United States*, 495 U. S., at 432. See also *id.*, at 447 (*Scalia*, J., concurring in judgment) ("The Twenty-first Amendment ... empowers North Dakota to require that all liquor sold for use in the State be purchased from a licensed in-state wholesaler"). (Granholm v. Heald 03-116, Slip, pages 25-26; available on-line at: http://www.law.indiana.edu/webinit/tanford/wine/1opinion.pdf).

19. Economic theory indicates that the provisions at issue in this case will result in higher retail prices for beer and wine than would exist in the absence of these provisions.

20. The policies prohibiting quantity discounts and the provision of gifts, rebates, special services and more will ensure that distributors charge all retailers the same prices for beer and wine, regardless of the size, location, or other characteristics of the retailer, and will result in higher prices than would exist in the absence of these policies. Quantity discounts are most likely to be taken advantage of by large retailers who sell in greater volume and who, because of their size, are in a better bargaining position to obtain lower prices from distributors. Retailers who purchase beer and wine at lower cost because of the quantity discounts will almost certainly pass their cost savings along to consumers in the form of lower retail prices for beer and wine. Thus, the Washington policies prohibiting quantity discounts will result in higher retail prices for beer and wine.

21. A policy requiring distributors to set the prices they charge retailers for beer and wine at least ten percent above their cost of obtaining these products will raise retailers' costs for beer and wine. In the absence of this policy, at least some distributors would be likely to compete on the basis of price and would charge retailers prices that are less than ten percent above their costs. This ten percent minimum markup is on top of the ten percent minimum markup above production costs that beer and wine producers are required to charge distributors. The required markups by both producers and distributors will result in retailers facing higher costs. The retailers' higher costs for beer and wine will be passed along to consumers in the form of higher retail prices for beer and wine.

22. The 'post and hold' provisions are important elements of Washington's three-tier system. Specifically, these provisions allow for the relatively straightforward implementation and enforcement of the prohibitions on quantity discounts and the minimum markup requirements. This 'post' component of the system allows the WLSCB to readily observe the prices that distributors are charging retailers for beer and wine, enabling them

to easily determine whether or not distributors are complying with the quantity discount ban and markup requirement. In addition, the 'hold' component of the system prohibits distributors from changing prices frequently, ensuring that all retailers pay the same prices for beer and wine during the 'hold' period.

By simplifying implementation and enforcement of the quantity discount ban and minimum markup requirements and prohibiting price changes for the specified period of time, Washington's 'post and hold' system results in higher and more stable distributors' prices for beer and wine than would be the case in the absence of these provisions. As a result, the higher costs of beer and wine to retailers will result in higher retail prices for these products.

23. As described in its August 29, 2003 letter to the Washington Attorney General's office and its subsequent complaint, the Plaintiff clearly recognizes that the policies at issue in this case, individually and in combination, result in at least some retailers, including Costco, paying distributors higher prices for beer and wine than they would in the absence of the policies and, consequently, in higher retail prices for beer and wine. For example, as stated in its complaint, "Costco seeks to create lower prices and greater choices for Washington consumers," going on to note:

> Warehouse clubs and retailers would lower their costs and thus offer better prices and selection to consumers if permitted to negotiate discounts based on their efficient buying and distribution practices and good credit, to buy directly from all wineries and brewers where that makes economic sense, and to supply their stores through their own distribution systems.

Similarly, in its letter, Plaintiff states:

> Absent the challenged regulations, Costco would not necessarily expect in the near term to be able to secure all the efficiencies from sellers, but would nevertheless expect to be able quickly to show its members greater values than achievable under the present system. Indeed, Costco warehouses in California, which has less restrictive liquor distribution regulations, are able to sell many items to members at prices below those in Washington. For example, Moet Dom Perignon champagne, of which Costco sells more than any other retailer in the country, Keith Naughton and Tara Weingarten, *Out of the Box Thinking*, NEWSWEEK, May 12, 2003 at 40, recently cost consumers over $5 more per bottle in Washington than in California.

Additional evidence that the policies at issue result in higher prices in Washington is found on the Costco web-site (accessed 5/30/2005): http://www.costco.com/Common/CategoryMain.aspx?cat=3605. Consumers in a limited number of states (CA, ID, IL, NM, OR, WA, and

WV) can purchase wine on-line from Costco. Consumers in all of these states but Washington face one set of prices for the products available in their states, while consumers in Washington face a different set of prices. On 5/30/05, only two of the wine products that were available to consumers in other states were available to Washington consumers: a 12 bottle case of Columbia Crest Grand Estate Merlot, 2001, and single bottles of Dom Perignon Brut Champagne, 1996. The price for the case of Merlot was $104.99 for consumers in Washington, compared to a price of $84.99 for consumers in other states, a difference of $20.00 per case (well above the approximately $2.40 difference between the excise tax on a case of wine in Washington and the average excise tax on a case of wine in the other states). Similarly, the price for the bottle of Champagne was $108.99 for consumers in Washington, compared to a price of $98.99 for consumers in other states. The $10.00 difference in the price per bottle is again well above the differences that would be expected based on differences in the states' excise taxes on sparkling wine.

As indicated by economic theory, removing the policies at issue in this case would result in lower retail prices for beer and wine.

## EFFECT OF ALCOHOLIC BEVERAGES PRICES ON ALCOHOL USE

24. Economists and other researchers have conducted numerous studies over the past twenty-five years that examine the impact of alcoholic beverage prices on alcohol use. These studies have applied a variety of econometric and other statistical methods to aggregate and individual level data from US states, the US as a whole, many other countries, and other geographic units. This body of research clearly demonstrates that increases in the prices of alcoholic beverage lead to significant reductions in alcohol use, while reductions in alcohol prices lead to increased drinking. Important critical reviews of this research include:

- Chapter 9 of Background Papers, "The Effects of Price on Alcohol Use, Abuse, and Their Consequences," in: National Research Council and Institute of Medicine. *Reducing Underage Drinking: A Collective Responsibility, Background Papers*, Washington, DC: The National Academies Press, 2004 (available on-line at: http://www.nap.edu/books/0309089352/html/541.html).
- F.J. Chaloupka, M. Grossman, and H. Saffer, "The Effects of Price on Alcohol Consumption and Alcohol-Related Problems," *Alcohol Research & Health*, 2002 (available on-line at http://www.niaaa.nih.gov/publications/arh26-1/22-34.htm).
- Chapter 6, "Economic and Health Services Perspectives," of: U.S. Department of Health and Human Services. *10th Special Report to the U.S. Congress on Alcohol and Health: Highlights from Current Research from the Secretary of Health and Human Services*, Bethesda MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism, 2000 (available on-line at http://www.niaaa.nih.gov/publications/10report/chap06.pdf);

- P.J. Cook and M.J. Moore, "Alcohol" in *The Handbook of Health Economics*, edited by A.J. Culyer and J.P. Newhouse, New York: Elsevier Science B.V., 2000 (also published as National Bureau of Economic Research Working Paper Number 6905, January 1999, available at: http://www.nber.org);
- Chapter 5, of G. Edwards, et al., *Alcohol Policy and the Public Good*, Oxford University Press, 1994; and
- S.F. Leung and C.E. Phelps, "My Kingdom for a Drink.....? A Review of Estimates of the Price Sensitivity of Demand for Alcoholic Beverages," in *Economics and the Prevention of Alcohol-Related Problems*, National Institute on Alcohol Abuse and Alcoholism Research Monograph – 25, U.S. Department of Health and Human Services, 1993.

25. This research confirms one of the most fundamental laws of economics – that of the downward sloping demand curve, which states that as the price of a product rises, the quantity demanded of that product falls and that as the price of a product falls, the quantity demanded of that product rises. With respect to alcohol use, the reduction in the quantity demanded following a price increase is the result of increased cessation among current drinkers, reduced initiation among potential drinkers, reduced relapse among former drinkers, reductions in the frequency of drinking by continuing drinkers, and reductions in the number of drinks consumed in a typical drinking occasion by continuing drinkers. The first three of these (increased cessation, reduced initiation, and reduced relapse) result in a reduction in the number of drinkers, or drinking prevalence. The combination of reduced drinking prevalence and reduced alcohol consumption among continuing drinkers leads to overall reductions in alcohol consumption.

26. State governments have a variety of policy tools available to them that can be used to raise the price of alcoholic beverages (see, for example: F.J. Chaloupka, "The Effects of Price on Alcohol Use, Abuse, and Their Consequences," 2004, cited above; and H.D. Holder, *Alcohol and the Community: A Systems Approach to Prevention*, Cambridge University Press, 1998). These include elements of the three-tier system that affect the distribution of alcoholic beverages, such as the Washington state policies at issue in this case that prohibit the provision of quantity and other discounts by distributors to retailers, require distributors to charge retailers prices at least ten percent above their costs, require beer and wine distributors to 'post' their prices and 'hold' these prices, and impose other constraints. Likewise, states have adopted other policies, usually as part of their three-tier systems regulating the distribution of alcoholic beverages, that result in higher alcoholic beverages prices and that are not at issue in this case, including monopoly control over parts of the wholesale and/or retail alcoholic beverage distribution system, exclusive territory provisions, limits on outlet density, and limits on price advertising and policies that raise the costs of selling alcoholic beverages (such as higher fees for licenses to distribute or sell alcoholic beverages). In addition, nearly all states impose excise taxes on all alcoholic beverages, while many states restrict price promotions such as 'happy hour' discounts and the sale of beer by the pitcher. Many economic studies of the demand for alcohol employ direct measures of alcoholic beverage prices that reflect the combination of these policies on beer, wine and spirits prices; others use measures of alcoholic beverage excise taxes as proxies for alcoholic beverage prices.

States have used a wide variety of different combinations of these policies over time, with the particular set of policies a given state employs at a particular time resulting from a combination of historical, economic, social, and political factors. While some policies may seem to more directly raise prices (e.g. increases in excise taxes on alcoholic beverages) than others (such as the set of policies at issue in this case), relying solely on the former can result in prices that fall over time after accounting for inflation. As shown by the University of Minnesota's Alcohol Epidemiology Program (Alcohol Epidemiology Program, *Alcohol Policies in the United States: Highlights from the 50 States*, Minneapolis, University of Minnesota, 2000; available on-line at: http://www.impacteen.org/generalarea_PDFs/Alcohol%20Policies%20in%20the%20United%20States.PDF), there has been a general erosion (often substantial) in most state beer, wine, and distilled spirits excise tax rates from the late 1960s through 2000. The erosion in the inflation adjusted value of these taxes, along with similar erosion in the value of federal alcoholic beverage excise taxes, has contributed to a general decline in inflation adjusted prices for alcoholic beverages (see F.J. Chaloupka, "The Effects of Price on Alcohol Use, Abuse, and Their Consequences," 2004 cited above, for a more detailed discussion). This results from the fact that most alcoholic beverage excise taxes are specific taxes that need to be increased regularly to keep pace with inflation and the often strong industry and voter opposition to tax increases. In contrast, policies like Washington's that require minimum producer and distributor markups will tend to result in prices that rise with inflation over time.

27. Economists use the term 'price elasticity of demand' to describe the change in the quantity demanded that results from an increase in price. Formally, the price elasticity of alcohol demand is defined as the percentage change in the quantity of alcohol consumed resulting from a one percent increase in alcoholic beverage prices. The 1993 Leung and Phelps review of the literature cited above supported price elasticity estimates of –0.3 for beer, -1.0 for wine, and –1.5 for distilled spirits, meaning that a ten percent increase in the price of all alcoholic beverages would reduce beer consumption by three percent, wine consumption by ten percent, and distilled spirits consumption by fifteen percent. More recent studies have confirmed the price responsiveness of alcoholic beverages (J.P. Nelson, "Broadcast Advertising and the U.S. Demand for Alcoholic Beverages, *Southern Economic Journal*, 1999; J.P. Nelson, "Economic and Demographic Factors in U.S. Alcohol Demand: A Growth Accounting Analysis, *Empirical Economics*, 1997; D.S. Kenkel, "New Estimates of the Optimal Tax on Alcohol, *Economic Inquiry*, 1996; W.G. Manning, L. Blumberg, and L.H. Moulton, "The Demand for Alcohol: The Differential Response to Price," *Journal of Health Economics*, 1995; and D.S. Kenkel, "Drinking, Driving, and Deterrence: The Effectiveness and Social Costs of Alternative Policies," *Journal of Law and Economics*, 1993). Nelson's 1997 study (cited above) estimates that the overall price elasticity of demand for alcohol is -0.52. As noted above, the reductions in overall alcohol consumption resulting from higher alcoholic beverage prices are the result of reductions in the number of drinkers (reduced drinking prevalence) and reductions in drinking frequency and the number of drinks consumed when drinking among continuing drinkers.

The price differences described above (in paragraph 22), in combination with these elasticity estimates, provide some indication of the reductions in alcohol consumption that result from the set of policies employed in Washington. For the two products described above, the differences in prices between Washington and several other states range from just over 10 percent (for the champagne) to over 23.5 percent (for the Merlot). To the extent that this range reflects the differences in other product prices, this suggests that overall alcohol consumption in Washington is between 5 and 12 percent lower than it would be in the absence of these policies. While part of this difference results from differences in excise tax rates between Washington and other states, much of it results from the differences in prices accounted for by other policies.

28. Because of the addictive nature of alcohol use, for at least some drinkers, the impact of sustained inflation adjusted increases in alcoholic beverage prices will grow over time. Studies that account for the addictive nature of alcohol demand conclude that the long run impact of alcoholic beverage price increases is larger than the short run impact. Grossman and colleagues (M. Grossman, F.J. Chaloupka and I. Sirtalan, "An Empirical Analysis of Alcohol Addiction: Results from the Monitoring the Future Panels," *Economic Inquiry* 1998), for example, estimated an average price elasticity of alcohol demand of –0.29 for young adults in models that ignored the addictive nature of alcohol use. In models that accounted for addiction, they estimated an average long-run price elasticity of alcohol demand of –0.65, about 60 percent higher than their estimate of the short-run elasticity (which was, in turn, almost 40 percent higher than the average estimate from the non-addictive models).

29. Alcohol use among youth is the focus of much of the econometric research on alcohol consumption given the relatively high consequences of underage and young adult drinking. Cook and Moore (2000; cited above), for example, describe three reasons for why young people are of particular concern: alcohol involvement in traffic crashes and other alcohol-related violence is high among youth (relative to older persons); because of the addictive or habit forming nature of alcohol use, drinking among teens can lead to long term heavier drinking; and drinking during the transition from adolescence to adulthood can have a negative impact on educational attainment, family formation, and other aspects of human capital accumulation that can have negative long-term consequences.

30. Several empirical studies of youth drinking provide evidence consistent with that described above for overall alcohol use (see the review by M. Grossman, F.J. Chaloupka, H. Saffer, and A. Laixuthai, "Effects of Alcohol Price Policy on Youth: A Summary of Economic Research," *Journal of Research on Adolescence* 1994, for example). As discussed by Grossman and his colleagues, these studies generally find that higher alcoholic beverage prices lead to larger reductions in drinking among more frequent or heavier drinkers than among infrequent or lighter drinkers. Conversely, reductions in alcoholic beverage prices will lead to disproportionate increases in more frequent and heavier drinking among youths. A recent study by Grossman (M. Grossman, "Individual Behaviors and Substance Use: The Role of Price," National Bureau of Economic Research Working Paper Number 10948, 2004; available on-line at: www.nber.org)

confirms the finding that heavy drinking by youth is quite responsive to price. Based on time series data on drinking prevalence and the prevalence of binge drinking among high school seniors from 1975 through 2003, Grossman estimates that an increase in alcoholic beverage prices would reduce the prevalence of binge drinking in the past two weeks by as much as 4.6 times as much as it would reduce past year drinking prevalence (his estimated price elasticity of past year drinking prevalence is between -0.43 and -0.55, while his estimated price elasticity for the prevalence of binge drinking in the past two weeks is between -0.93 and -1.98). Similarly, a recent study by Kou and colleagues (M. Kuo, H. Wechsler, P. Greenberg, and H. Lee, "The Marketing of Alcohol to College Students: The Role of Low Prices and Special Promotions," *American Journal of Preventive Medicine*, 2003; available on-line at: http://www.hsph.harvard.edu/cas/Documents/marketingalcohol/AlcoholPromotion.pdf) finds that low prices and a variety of price-promotions for alcoholic beverages lead to significant increases in drinking and binge drinking among college students.

## EFFECT OF ALCOHOLIC BEVERAGES PRICES ON THE CONSEQUENCES OF ALCOHOL USE

31. Alcohol use and abuse results in a number of health and social consequences, including: traffic crashes and other accidents; violence; and liver cirrhosis and other liver disease, a number of cancers, and other health consequences. The Centers for Disease Control and Prevention, for example, estimated that over 75,000 deaths in the United States in 2001 were caused by excessive alcohol consumption, resulting in the loss of nearly 2.3 million years of potential life - about 30 years lost per alcohol attributable death (Centers for Disease Control and Prevention, "Alcohol-Attributable Deaths and Years of Potential Life Lost – United States, 2001," *Morbidity and Mortality Weekly Report*, 2004). Applying the same methodology to Washington state, CDC estimates that 1,634 deaths accounting for 45,563 years of potential life lost were attributable to excessive alcohol use in 2001 (http://apps.nccd.cdc.gov/ardi/Homepage.aspx).

32. The impact of alcohol consumption on health is complex. Some recent studies find positive cardiovascular health effects (such as reduced risk of coronary heart disease) for low and moderate drinking. However, the negative health consequences of alcohol use (particularly heavy use), including cardiovascular diseases, liver cirrhosis, and cancers have been well established for many years. In addition, numerous studies have demonstrated the negative impact on fetal development of alcohol use by pregnant women. Recent thorough reviews of these studies are contained in Chapters 1, 2, 4 and 5 of the *10th Special Report to the U.S. Congress on Alcohol and Health* (cited above), and Chapters 1 through 10 of *Recent Developments in Alcoholism: Volume 14, The Consequences of Alcoholism – Medical, Neuropsychiatric, Economic, Cross-Cultural* (edited by Marc Galanter, published by Plenum Press, 1998). CDC's recent estimates for 2001 (cited above) indicate that nearly half of all deaths from excessive alcohol use result from chronic health conditions, including liver disease, alcohol-attributable cancers, cardiovascular diseases, and others; just over half of alcohol attributable deaths in Washington are from these conditions.

33. In addition, a variety of social problems have been associated with alcohol problems, including traffic crashes, other accidents, and violence. Many studies have demonstrated the impact of alcohol use in increasing the risks of injury or death in traffic crashes, falls and fires, and other accidents. The pattern of drinking is particularly important in explaining this risk, with binge drinking clearly leading to significantly increased risks. Similarly, research demonstrates that alcohol use interacts with personality characteristics and other factors to increase the risk of violence and other aggressive behavior. More recent research also suggests that alcohol use increases the potential for victimization from violence and raises the risk of acquiring a sexually transmitted disease. See Chapters 1, 4, and 7 of the *10th Special Report to the U.S. Congress on Alcohol and Health* (cited above) for detailed discussions of these literatures. CDC's recent estimates for 2001 (cited above) indicate that over half of all deaths from excessive alcohol use result from traffic crashes and other accidents, homicide and suicide, and other acute conditions. Given the disproportionate involvement of youth in these deaths, they account for over sixty percent of alcohol-attributable years of potential life lost in Washington.

34. In addition to the health and social consequences of alcohol use and abuse, alcohol use also has a negative impact on the accumulation of human capital (education, for example) and on labor productivity (Cook and Moore, cited above; J. Mullahy and J.L. Sindelar, "Drinking, Problem Drinking, and Productivity," Chapter 13 in Galanter, ed., cited above).

35. The health, social, and productivity consequences of alcohol use and abuse result in substantial economic costs from alcohol abuse. Several studies over the past two decades have estimated the costs of alcohol abuse, including the health care costs, productivity losses, costs associated with accidents and violence, and others (see Chapter 6 of the *10th Special Report to the U.S. Congress on Alcohol and Health* for a review of these studies). The most recent comprehensive study estimated the overall economic costs of alcohol abuse in the U.S. at $148 billion in 1992 (H.J. Harwood, D. Fountain, and G. Livermore, "Economic Costs of Alcohol Abuse and Alcoholism," Chapter 11 in Galanter, ed., cited above). An update of these estimates based on population growth and inflation puts these costs at $184.6 billion in 1998 (H. Harwood, *Updating Estimates of the Economic Costs of Alcohol Abuse in the United States: Estimates, Update Methods, and Data*, prepared by the Lewin Group for the National Institute on Alcohol Abuse and Alcoholism, 2000; available on-line at: http://www.niaaa.nih.gov/publications/economic-2000/). Assuming costs have increased proportionally with inflation and population growth since 1998, current economic costs from alcohol abuse are approaching one-quarter of a trillion dollars.

36. The findings described above – that public policies that result in higher alcoholic beverage prices, such as the Washington policies at issue in this case, lead to reduced alcohol consumption and that alcohol use and abuse results in significant health, social, and economic consequences – means that higher alcoholic beverage prices will lead to significant reductions in the consequences of alcohol use and abuse. A large and growing number of studies from economists and others generally support this conclusion. See F.J. Chaloupka, 2004 (cited above), Chapter 6 of the *10th Special Report to the U.S. Congress*

*on Alcohol and Health* (cited above), P.J. Cook and M.J. Moore (cited above) and F.J. Chaloupka, M. Grossman, and H. Saffer, (1998 and 2002, cited above), for recent reviews of these studies

37. Much of the research on the impact of alcoholic beverage prices on consequences of alcohol use has examined the impact on drinking and driving behavior. Many of these studies estimate that a ten percent increase in the price of alcoholic beverages will result in a 5-10 percent reduction in overall motor vehicle fatalities, with even larger percentage reductions in fatality rates that reflect greater levels of alcohol involvement. Estimates from studies of youth motor vehicle accident fatalities imply even larger effects; these studies predict that a ten percent increase in price will reduce youth fatalities by between 7 and 17 percent. In contrast, the findings from these studies indicate that reductions in alcoholic beverage prices would lead to increases in alcohol-related motor vehicle accident fatalities, with a relatively larger impact on youth fatalities. These findings are supported by recent studies based on survey data that conclude that higher alcoholic beverage prices reduce the frequency of drinking and driving, with relatively larger effects among young persons. See F.J. Chaloupka, M. Grossman, and H. Saffer (1998, cited above) for a review of these studies.

38. Similarly, several econometric studies have examined the impact of alcoholic beverage prices on liver cirrhosis death rates, other alcohol-related diseases, and other accidents related to alcohol. In general, these studies conclude that higher alcoholic beverage prices result in fewer health consequences from alcohol use and abuse and in fewer injuries resulting from alcohol use and abuse (see Chaloupka, Grossman, and Saffer (1998, cited above) for a review of these studies). For example, Cook and Tauchen (P.J. Cook and G. Tauchen, "The Effect of Liquor Taxes on Heavy Drinking," *Bell Journal of Economics,* 1982) find that higher distilled spirits taxes would reduce liver cirrhosis death rates by at least as much as they would reduce overall distilled spirits consumption. Sloan and colleagues (F.A. Sloan, B.A. Reilly, and C. Schenzler, "Effects of Prices, Civil and Criminal Sanctions, and Law Enforcement on Alcohol-Related Mortality," *Journal of Studies on Alcohol,* 1994) find that higher alcohol prices would reduce deaths from suicide. Ohsfeldt and Morrissey (R.L. Ohsfeldt and M.A. Morrissey, "Beer Taxes, Workers' Compensation, and Industrial Injury," *Review of Economics and Statistics,* 1997) conclude that higher beer taxes result in fewer workplace accidents. More recent studies by Chesson and colleagues (H. Chesson, P. Harrison, and W.J. Kassler, "Sex Under the Influence: The Effect of Alcohol Policy on Sexually Transmitted Disease Rates in the U.S.," *Journal of Law and Economics,* 2000) and Grossman and colleagues (M. Grossman, R. Kaestner, and S. Markowitz, "An Investigation of the Effects of Alcohol Policies on Youth STDs," National Bureau of Economic Research Working Paper Number 10949, 2004) have similarly found that higher alcoholic beverage prices reduce sexually transmitted disease rates, including gonorrhea, syphilis, and, possibly, HIV/AIDS rates.

39. A growing number of studies have examined the effects of alcoholic beverage prices on violence and crime. Studies using state-level data on homicide, and other violent crime rates conclude that higher alcoholic beverage prices significantly reduce these crimes. For

example, Cook and Moore (P.J. Cook and M.J. Moore, "Economic Perspectives on Reducing Alcohol-Related Violence," in *Alcohol and Interpersonal Violence: Fostering Multidisciplinary Perspectives*, 1993) find that higher beer taxes lead to significant reductions in rape and robbery rates, while Sloan and colleagues (cited above) conclude that higher alcoholic beverage prices result in lower homicide rates. More recent studies led by Markowitz based on survey data conclude that higher alcoholic beverage prices lead to less family violence, including spouse and child abuse (S. Markowitz, "The Price of Alcohol, Wife Abuse, and Husband Abuse," *Southern Economic Journal*, 2000; and S. Markowitz and M. Grossman, "The Effects of Beer Taxes on Physical Child Abuse," *Journal of Health Economics*, 2000). Likewise, Grossman and Markowitz (M. Grossman and S. Markowitz, "Alcohol Regulation and Violence on College Campuses," in *Economic Analysis of Substance Use and Abuse: The Experience of Developed Countries and Lessons for Developing Countries*, 2001) find that higher alcoholic beverage prices reduce violence and delinquency among college students. In contrast, the findings from these studies indicate that reductions in alcoholic beverage prices would result in increased crime and violence.

40. Similarly, a growing number of economic studies have focused on the impact of alcohol use on various educational outcomes. For example, two studies examined the impact of alcoholic beverage prices on alcohol use and educational attainment. Yamada and his colleagues (T. Yamada, M. Kenix, and T. Yamada, "The Impact of Alcohol Consumption and Marijuana Use on High School Graduation," *Health Economics*, 1996) conclude that higher alcoholic beverage prices would significantly increase the probability of high school graduation, while lower prices would reduce the probability of graduation. Similarly, Cook and Moore (P.J. Cook and M.J. Moore, "Drinking and Schooling," *Journal of Health Economics*, 1993) conclude that higher alcoholic beverage prices would significantly increase the probability of attending and graduating from a four year college or university. More recently, Williams and her colleagues (J. Williams, L.M. Powell, and H. Wechsler, "Does Alcohol Consumption Reduce Human Capital Accumulation? Evidence from the College Alcohol Study," *Applied Economics*, 2003) find that higher beer taxes and restrictions on alcohol-related price promotions (e.g. happy hours and sales of beer by the pitcher) reduce drinking among college students and, consequently raise student grade point averages.

## CONSISTENCY OF POLICIES WITH OTHER STATE EFFORTS TO REDUCE PROBLEM DRINKING AND ITS CONSEQUENCES

41. The policies at issue in this case are one component of a broad and comprehensive set of alcohol control statutes, regulations, and programmatic activities that together aim to reduce excessive drinking, underage drinking, and their consequences. This comprehensive effort includes:
    - Monopoly control of wholesale and retail sales of distilled spirits for off-premise consumption, one of 18 states with some form of state control over wholesale and/or retail sales. Recent empirical evidence indicates that monopoly control over spirits sales leads to significant reductions in spirits consumption and in overall alcohol consumption (J.P. Nelson, "Advertising Bans, Monopoly, and Alcohol Demand:

Testing for Substitution Effects Using State Panel Data," *Review of Industrial Organization*, 2003.

- Relatively high excise taxes on beer and wine. The state beer tax of $0.261 is nearly 40 percent higher than the median state beer tax, while the state wine tax of $1.80 per gallon is more than 160 percent higher than the median state wine tax. As described above, a large and growing body of research clearly demonstrates that higher alcoholic beverage excise taxes significantly reducing drinking, including excessive drinking and underage drinking, as well as numerous consequences of alcohol use and abuse.
- A comprehensive set of state policies targeting drinking and driving and enforcement programs implementing these policies. In Mothers Against Drunk Driving's most recent report grading states on their efforts to reduce drinking and driving, Washington was one of only ten states to receive a grade of B or higher for both its laws targeting drinking and driving and the state's law enforcement programs implementing these laws (see Mothers Against Drunk Driving, *Rating the States: 20002 Report*; available on-line at http://www.madd.org/stats/0,1056,5546,00.html). Again, the research evidence clearly shows that comprehensive and well-enforced efforts to curb drinking and driving are highly effective in reducing this consequence of drinking (see, for example, Chapter 7 of the *10th Special Report to the U.S. Congress on Alcohol and Health* (cited above) for a discussion of the research evidence on drunk driving laws and their enforcement).
- Comprehensive policies and enforcement efforts to reduce youth access to alcoholic beverages, including keg registration, mandatory server training, and regular compliance checks targeting the sale of alcoholic beverages to underage persons. Businesses caught selling to underage persons face significant penalties, including a fine of $500 or five day license suspension for the first violation, seven and thirty day license suspensions for the second and third violations, respectively, and cancellation of their license for a fourth violation. In addition, the WSLCB regularly publicizes the results of compliance checks, identifying businesses that violate the state's policies and commending those who do not sell to minors. The empirical evidence clearly indicates that comprehensive, well-enforced efforts to reduce youth access to alcoholic beverages lead to significant reductions in underage drinking and its consequences (K.K. Komro and T.L. Toomey, "Strategies to Prevent Underage Drinking," *Alcohol Research & Health*, 2002 ; available on-line at: http://www.niaaa.nih.gov/publications/arh26-1/5-14.pdf).
- The adoption of rules allowing the implementation of "Alcohol Impact Areas" (AIAs) and the subsequent implementation of AIAs in several localities. AIAs allow local governments, community organizations, and the WSLCB to take action in communities where there is a concentration of alcohol-related social problems. Actions taken in AIAs include, for example, bans on the sale of low-priced, high alcohol content beer and wine products in local alcohol outlets and increased enforcement actions. Early research evidence evaluating AIAs indicates that these have been effective in reducing the consequences of excessive drinking, including reductions in the incidence of alcohol-related emergency medical services and alcohol-related police calls (e.g. for public drunkenness), while generally being

positively perceived by local residents (see, for example, J. Tarnai, *Evaluation of the Tacoma, Washington, Alcohol Impact Area (AIA)*, 2003).

42. Taken together, Washington's comprehensive approach to reducing excessive drinking and its consequences that includes the policies at issue in this case has been effective in achieving this goal. Overall per capita alcohol consumption in Washington has been generally falling for the past 25 years and is below the national average and the average of other states in the region (see Figure 1). Similarly, while overall drinking prevalence is somewhat above the median state drinking prevalence rate (see Figure 2), binge drinking prevalence is below the median state binge drinking prevalence rate (see Figure 3). This suggests that Washington drinkers are more likely to drink moderately than drinkers across the U.S. This is further illustrated in Figures 4 through 6. Figure 4 presents state by state comparisons of per capita ethanol consumption per drinker in 1999; Washington, at 3.56 gallons of ethanol per drinker, is tied with Michigan for the lowest level among all states. Figure 5 shows that the frequency of binge drinking, particularly frequent binge drinking (3 or more times per month) is significantly lower among Washington drinkers than it is among all U.S. drinkers. Similarly, Figure 6 indicates that the typical Washington drinker is more likely than the typical U.S. drinker to drink moderately (1 to 2 drinks per occasion) during the occasions he/she drinks. The relatively moderate drinking behavior of Washington drinker implies relatively low rates of problems from alcohol abuse in Washington. This is illustrated in Figures 7 and 8. Figure 7 indicates that the prevalence and frequency of drinking and driving is low in Washington relative to the U.S., while Figure 8 shows that the alcohol-related traffic fatality rate is relatively low in Washington when compared to other states.

## EVIDENCE FROM OTHER STATES

43. In contrast to the extensive body of literature demonstrating that higher alcoholic beverage prices reduce drinking and its consequences, there are, to my knowledge, no published studies on the impact of the types of policies at issue in this case on these outcomes. This is in large part due to the lack of comprehensive data on these and related policies across states and over time. To provide some indication of the impact of these policies on alcohol use, I perform an econometric analysis of data from two states where changes in similar policies took place. The first state I examine is Nebraska which prohibited quantity discounts and required price posting by distributors for wine and distilled spirits until these policies were struck down in a Nebraska Supreme Court decision issued June 1, 1984 (*Louis Finocchiaro, Inc. v. Neb. Liquor Control Comm.*, 217 Neb. 487, 351 N.W.2d 701 (1984)). The second state I examine is Delaware which prohibited quantity discounts by distributors for beer, wine, and distilled spirits until the state eliminated this prohibition by amending the state regulations, effective June 1, 1992. It is important to note that the policies examined in both states are a subset of the policies at issue in this case; the impact of eliminating the Washington policies at issue on alcohol consumption in Washington would almost certainly be larger than the observed effects in Nebraska and Delaware given that the Washington policies go beyond those in the other states.

44. My econometric analysis of the data from Nebraska and Delaware is relatively simple, given the data available. The data employed in this analysis cover the period from 1970 through 2002; the estimates are presented in Table 1 (for Nebraska) and Table 2 (for Delaware). Figures 9 through 12 graphically present the findings from simulations for Nebraska that assume that the quantity discount prohibition and price posting policies remained in effect after June 1, 1984. Similarly, Figures 13 through 16 display simulations for Delaware that assume that the quantity discount ban remained in effect after June 1, 1992.

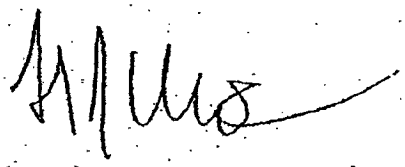
Estimates from four models for each state are presented in these Tables/Figures. The outcome examined in each model is the annual state-level consumption of ethanol, in gallons per capita (ages 14 years and older); data are from the NIAAA's database on alcohol consumption (http://www.niaaa.nih.gov/databases/consum03.htm). In order to control for changes in the social norms and broader economic and societal factors affecting alcohol consumption, each model includes a measure of broader alcohol consumption; Models 1 and 3 for each state use per capita ethanol consumption in the United States, while Models 2 and 4 use per capita ethanol consumption in the relevant Census region (i.e., the Midwest for Nebraska and the South for Delaware). In addition, to control for other general trends in alcohol consumption not captured by the broader consumption measure, each model includes a simple trend variable. Similarly, given the importance of taxes in affecting prices and, as a result, alcohol use, each model includes a variable reflecting the inflation-adjusted state excise tax on an ounce of ethanol (a consumption weighted average of the state taxes on beer, wine and distilled spirits).

Each model contains a set of variables reflecting the changes in the policies being examined. All models include an indicator for the period following the elimination of the relevant policies as well as a variable that interacts this indicator with the trend variable; Models 2 and 4 include an additional interaction variable reflecting the interaction of the policy indicator with the broader consumption measure (U.S. consumption in Model 2 and regional consumption in Model 4). These interaction terms are important in capturing the likelihood that the changes in policy will take some time to fully impact on consumption given that distributors and retailers will take some time to fully adjust to the new environment in which they operate. Finally, each model also includes an intercept.

45. The estimates for Nebraska show that the 1984 court decision striking down the state's ban on quantity discounts and price posting requirements for wine and distilled spirits resulted in a significant increase in overall alcohol consumption in Nebraska. The simulations indicate that by 2002, per capita ethanol consumption in Nebraska was at least 10.9 percent higher than it would have been had these policies been maintained, with the average estimate from the four models indicating just over a 26 percent increase. Similarly, the estimates for Delaware show that the 1992 elimination of the state's ban on quantity discounts on beer, wine, and distilled spirits from distributors to retailers resulted in a significant increase in alcohol consumption in Delaware. By 2002, the simulations indicate that per capita ethanol consumption in Delaware was approximately 15 percent higher than it would have been had these quantity discount ban remained in effect.

## SUMMARY

46. The Washington statutes and regulations at issue in this case result in retail prices for beer and wine that are higher than they would be in the absence of these policies. These higher prices lead to significant reductions in alcohol consumption - including heavy and/or binge drinking - among youths, young adults, and adults in Washington. The reductions in drinking that result from these higher prices result in reductions in the health, economic, and social consequences of alcohol use and abuse, improving the safety and well-being of the Washington populace.

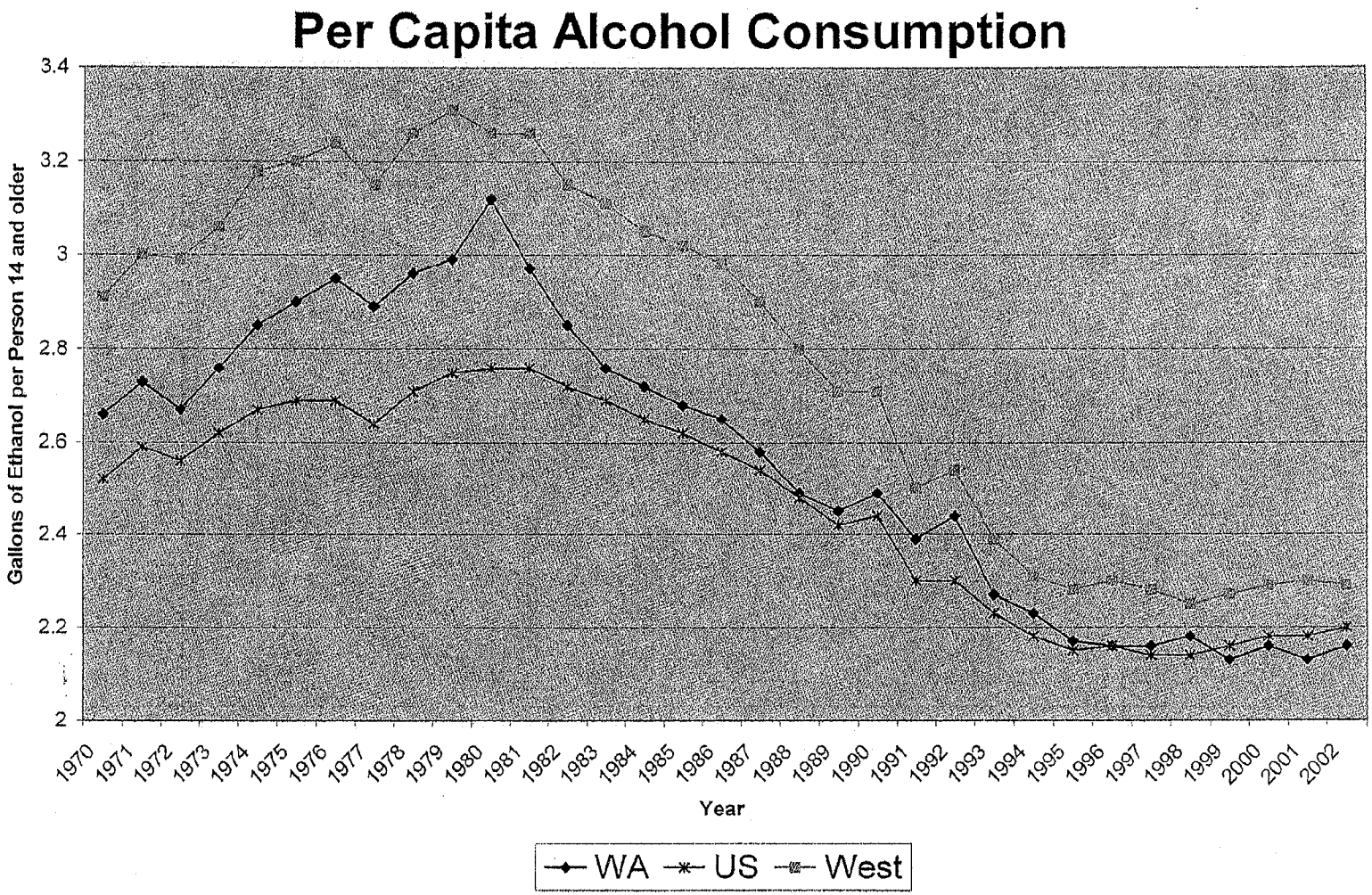


Frank J. Chaloupka

June 3, 2005

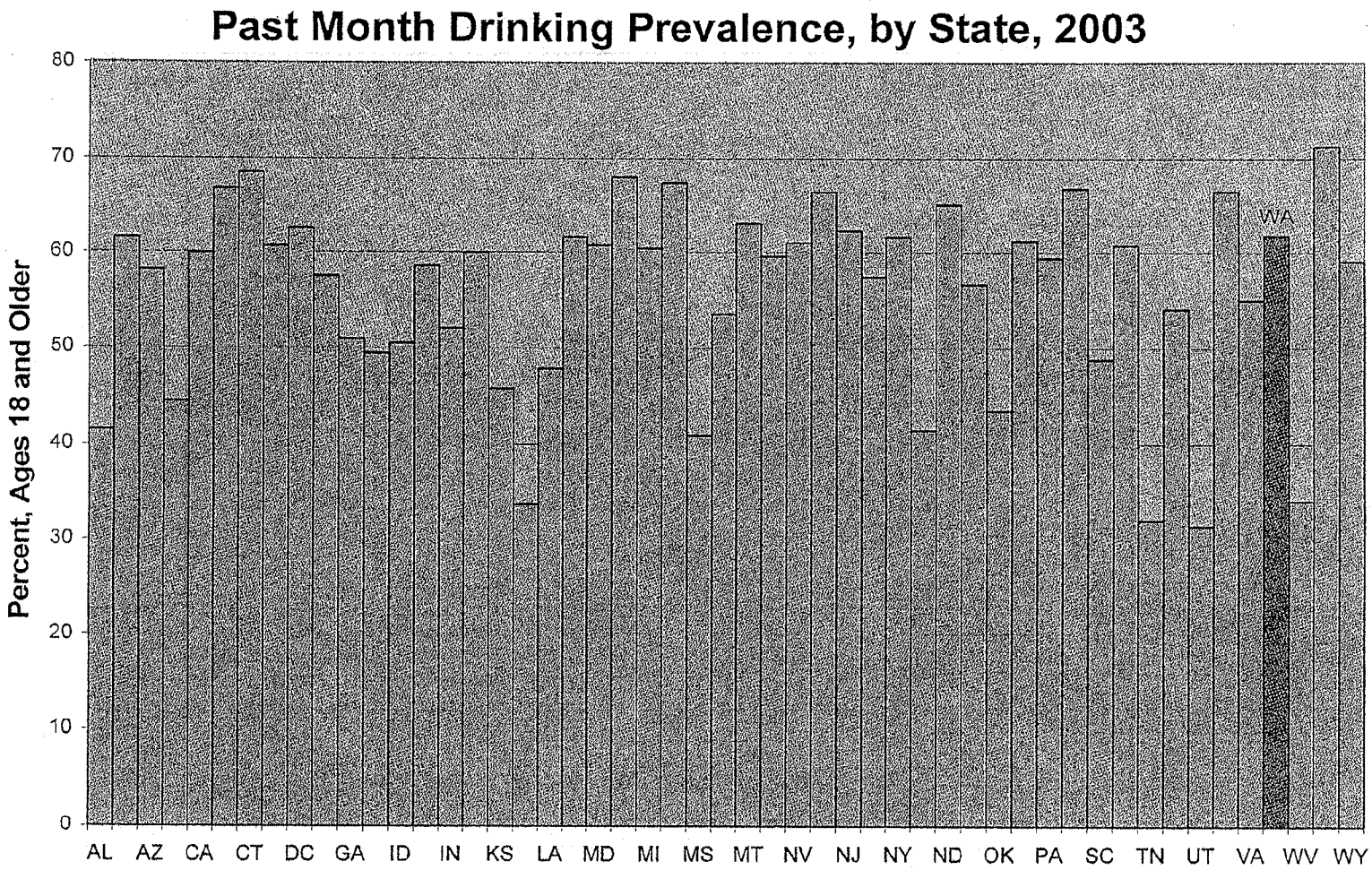
Date

Figure 1



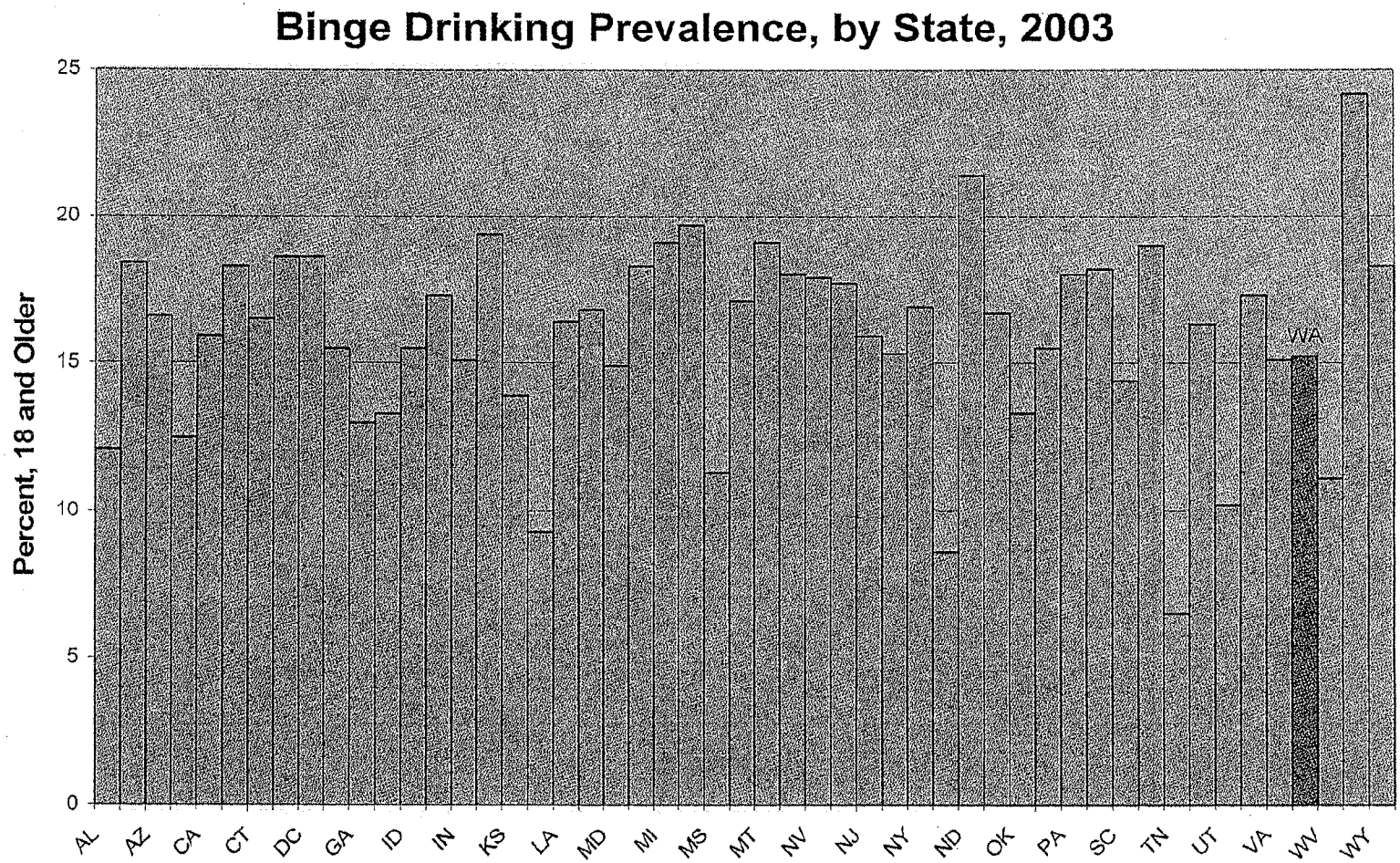

Source: National Institute on Alcohol Abuse and Alcoholism, http://www.niaaa.nih.gov/databases/consum03.htm

Figure 2



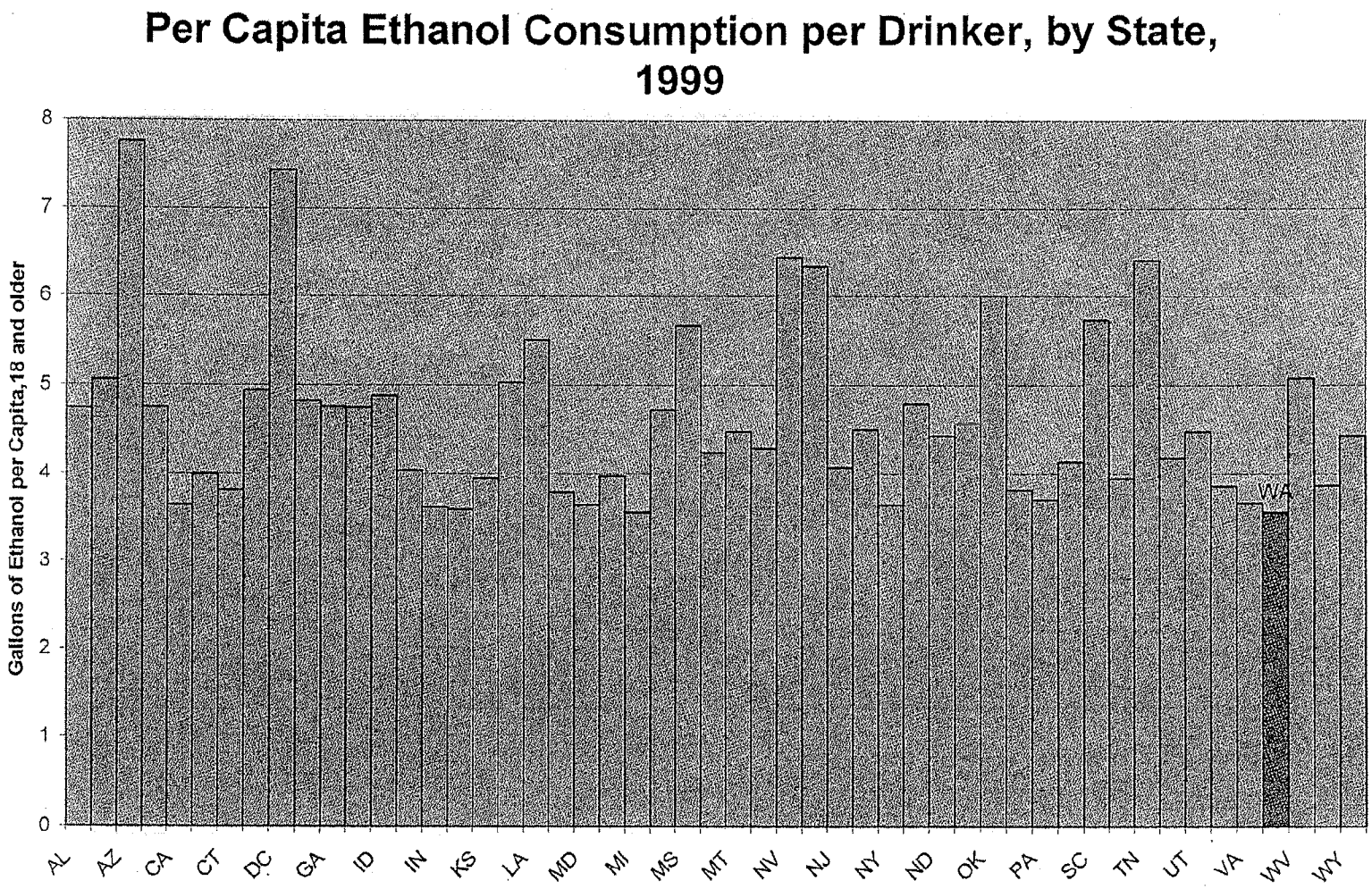

Source: Behavioral Risk Factor Surveillance System, http://apps.nccd.cdc.gov/brfss/list.asp?cat=AC&yr=2003&qkey=4411&state=All

Figure 3



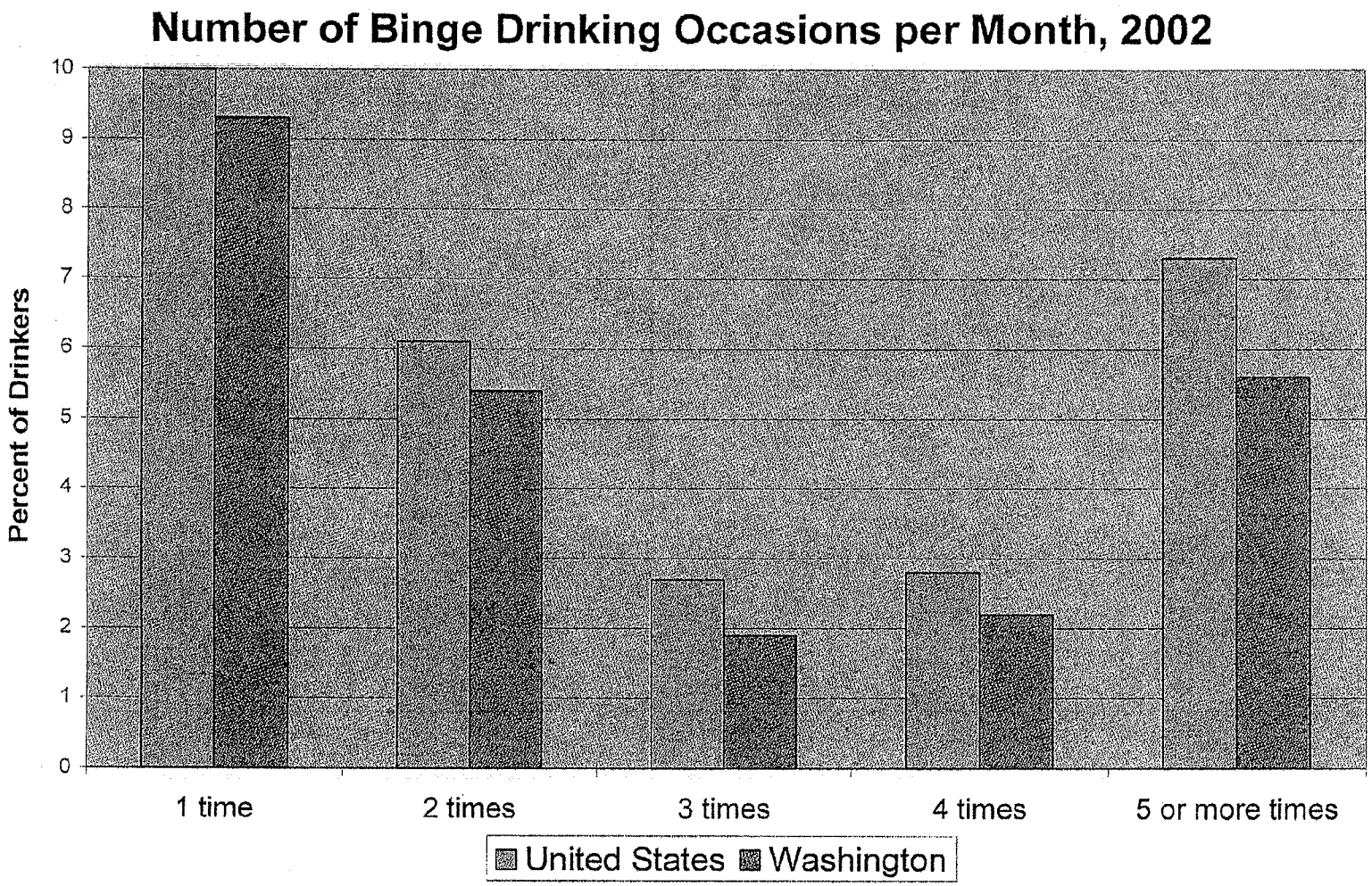

Source: Behavioral Risk Factor Surveillance System, http://apps.nccd.cdc.gov/brfss/list.asp?cat=AC&yr=2003&qkey=7306&state=All

Figure 4



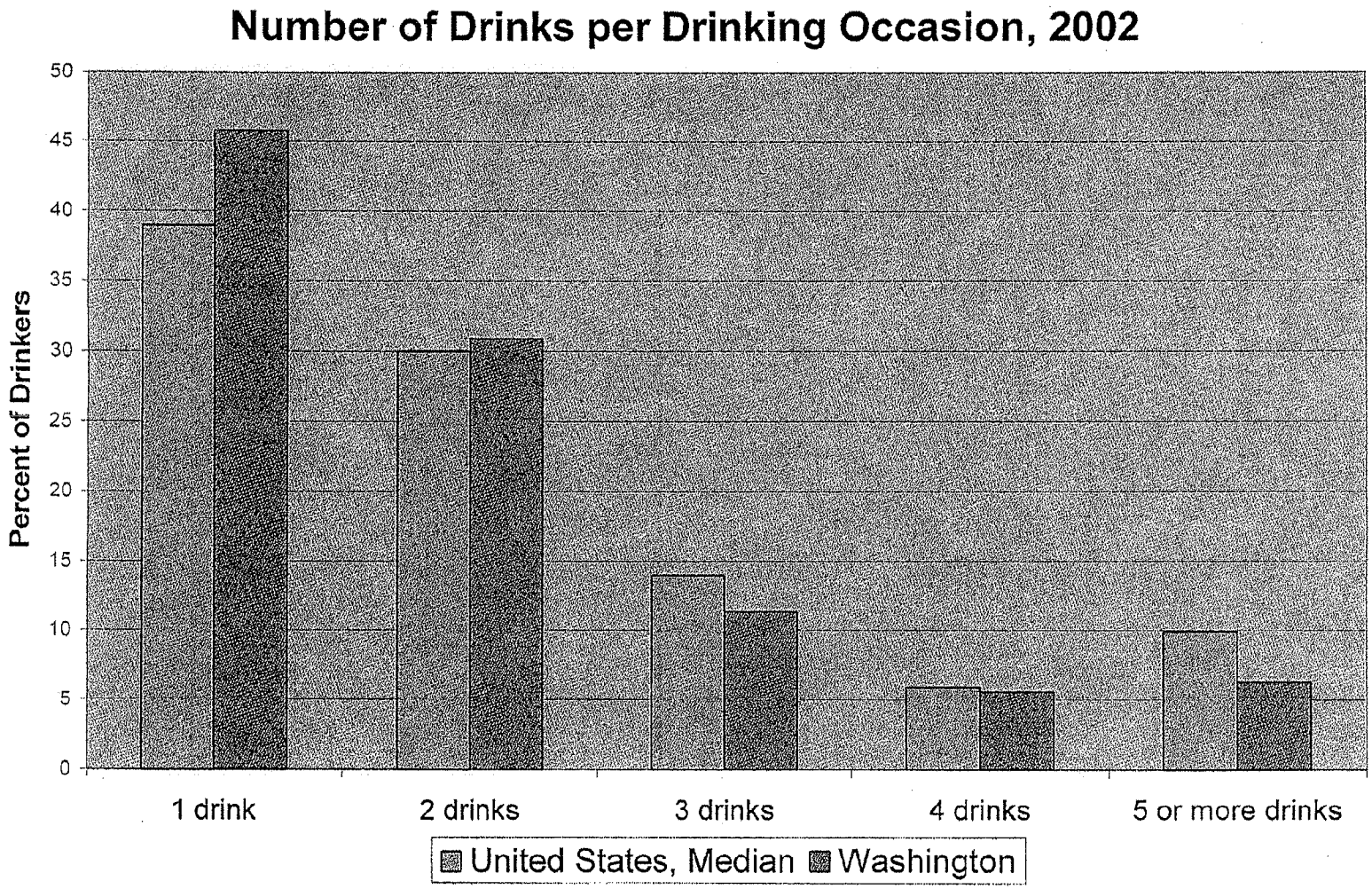

Source: National Institute on Alcohol Abuse and Alcoholism, http://www.niaaa.nih.gov/databases/consum04.htm

Figure 5



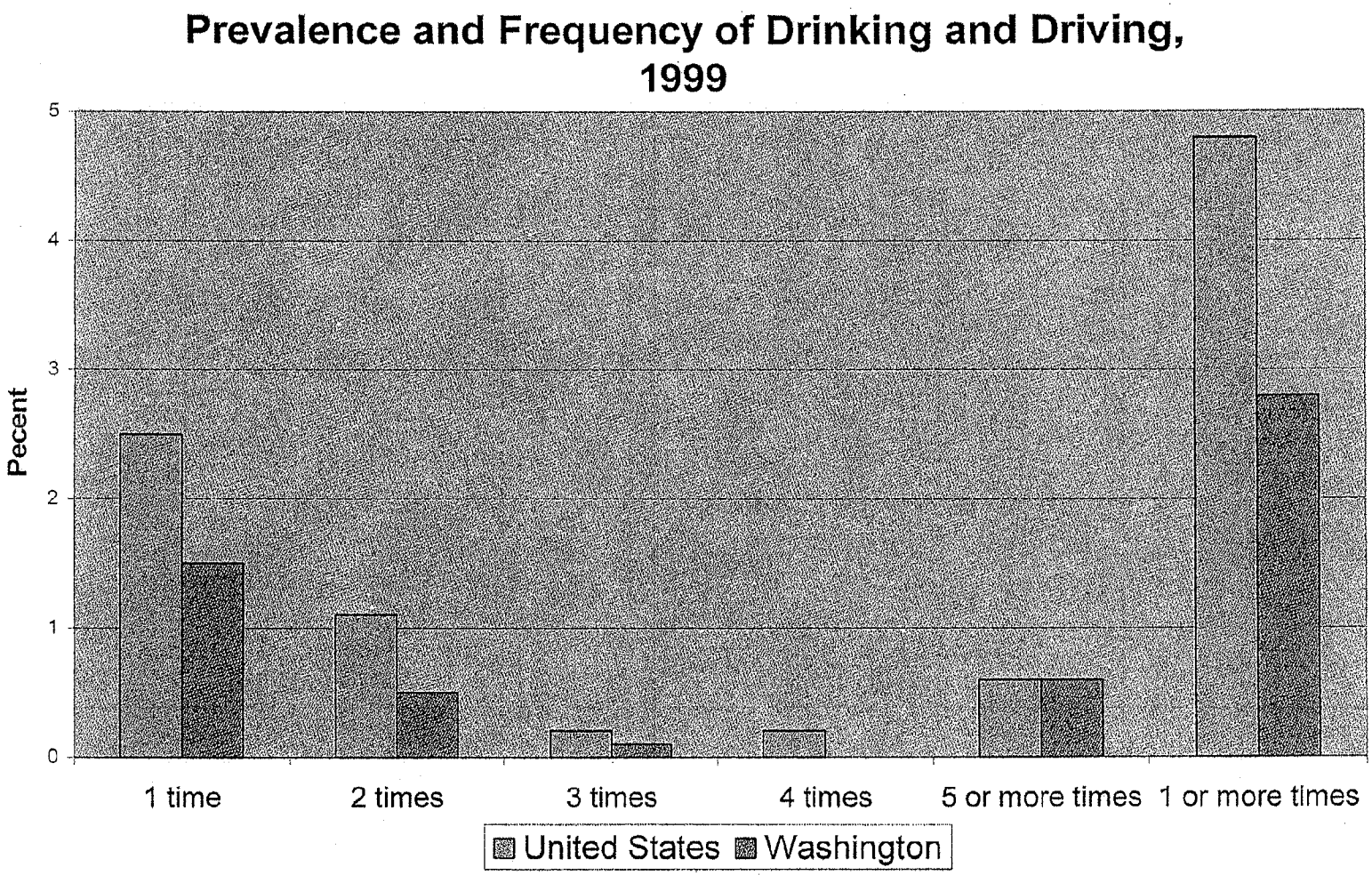

Source: : Behavioral Risk Factor Surveillance System, http://apps.nccd.cdc.gov/brfss/list.asp?cat=AC&yr=2002&qkey=992&state=All

Figure 6



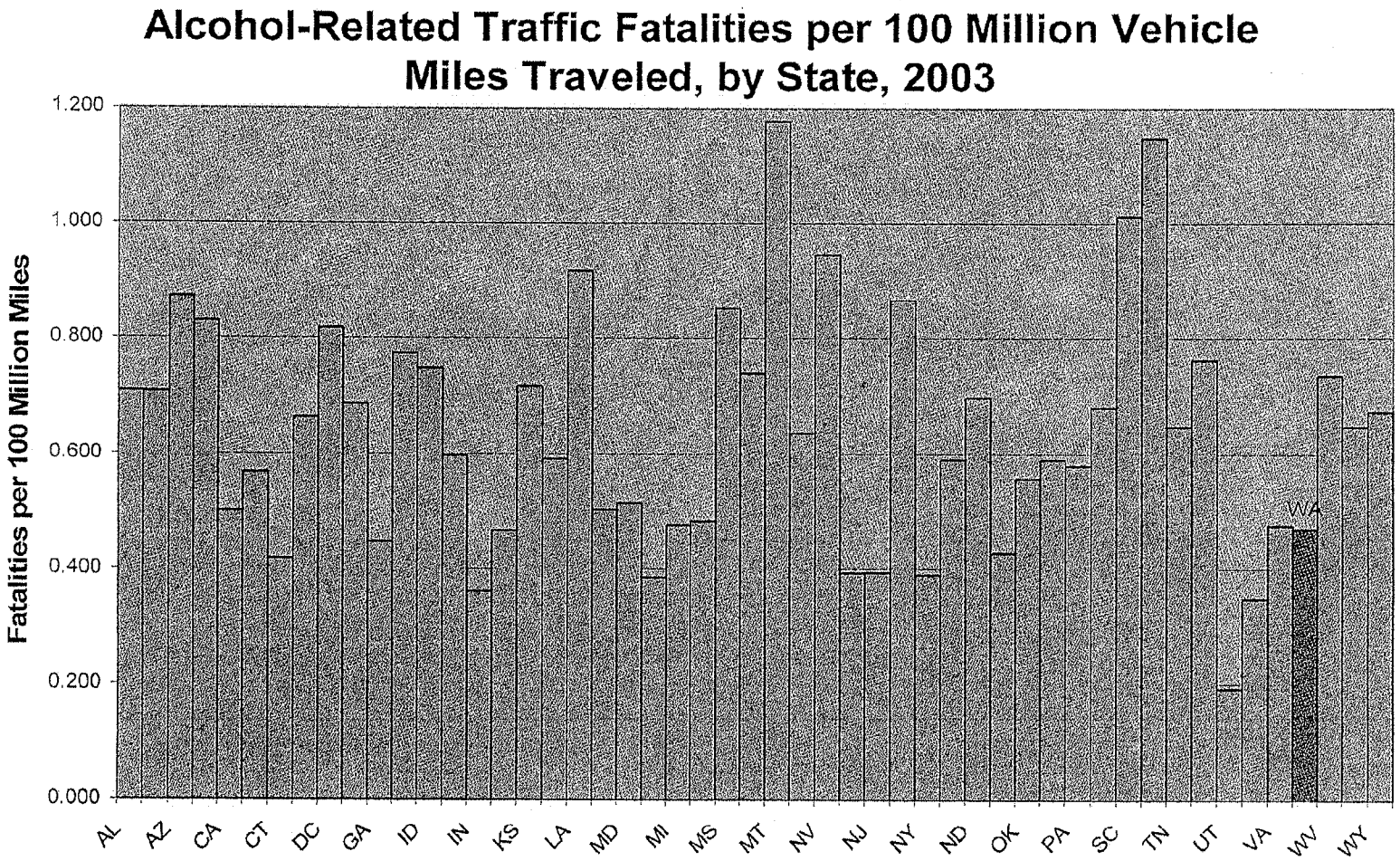

Source: Behavioral Risk Factor Surveillance System, http://apps.nccd.cdc.gov/brfss/list.asp?cat=AC&yr=2002&qkey=683&state=All

Figure 7




Source: Behavioral Risk Factor Surveillance System, http://apps.nccd.cdc.gov/brfss/list.asp?cat=AC&yr=1999&qkey=1612&state=All

Figure 8




Source: National Highway Traffic Safety Administration, Fatal Accident Reporting System; computations based on: http://www-fars.nhtsa.dot.gov/finalreport.cfm?title=States&stateid=0&year=2003&title2=Alcohol and http://www-fars.nhtsa.dot.gov/finalreport.cfm?title=States&stateid=0&year=2003&title2=Fatalities_and_Fatality_Rates

Table 1
Nebraska Estimates

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Trend | -0.017<br>(0.007) | -0.011<br>(0.007) | -0.024<br>(0.008) | -0.014<br>(0.007) |
| US Consumption | 0.855<br>(0.130) | | 1.262<br>(0.284) | |
| Midwest Consumption | | 0.944<br>(0.137) | | 1.282<br>(0.291) |
| Alcohol Tax | -5.376<br>(3.005) | -3.701<br>(2.908) | -6.013<br>(2.949) | -3.575<br>(2.872) |
| Policy Indicator | -0.528<br>(0.086) | -0.385<br>(0.071) | 0.777<br>(0.820) | 0.678<br>(0.813) |
| Policy * Trend | 0.030<br>(0.008) | 0.019<br>(0.006) | 0.034<br>(0.008) | 0.020<br>(0.006) |
| Policy * US Consumption | | | -0.495<br>(0.309) | |
| Policy * Midwest Consumption | | | | -0.422<br>(0.321) |
| Constant | 0.610<br>(1.043) | 0.381<br>(0.380) | -0.393<br>(0.722) | -0.455<br>(0.739) |
| F – Joint Significance of Policy Variables<br>(p-value in parentheses) | 28.94<br>(0.000) | 22.17<br>(0.000) | 21.26<br>(0.000) | 15.75<br>(0.000) |
| F | 94.91 | 100.92 | 84.08 | 86.64 |
| $R^2$ | 0.946 | 0.949 | 0.951 | 0.952 |
| Actual Consumption, 2002<br>(gallons of ethanol) | 2.23 | 2.23 | 2.23 | 2.23 |
| Predicted Consumption, 2002<br>(gallons of ethanol) | 1.80 | 2.01 | 1.44 | 1.82 |
| Difference<br>(gallons of ethanol) | 0.43<br>(0.169) | 0.22<br>(0.144) | 0.79<br>(0.277) | 0.41<br>(0.204) |

Note: Standard errors in parentheses.

Figure 9

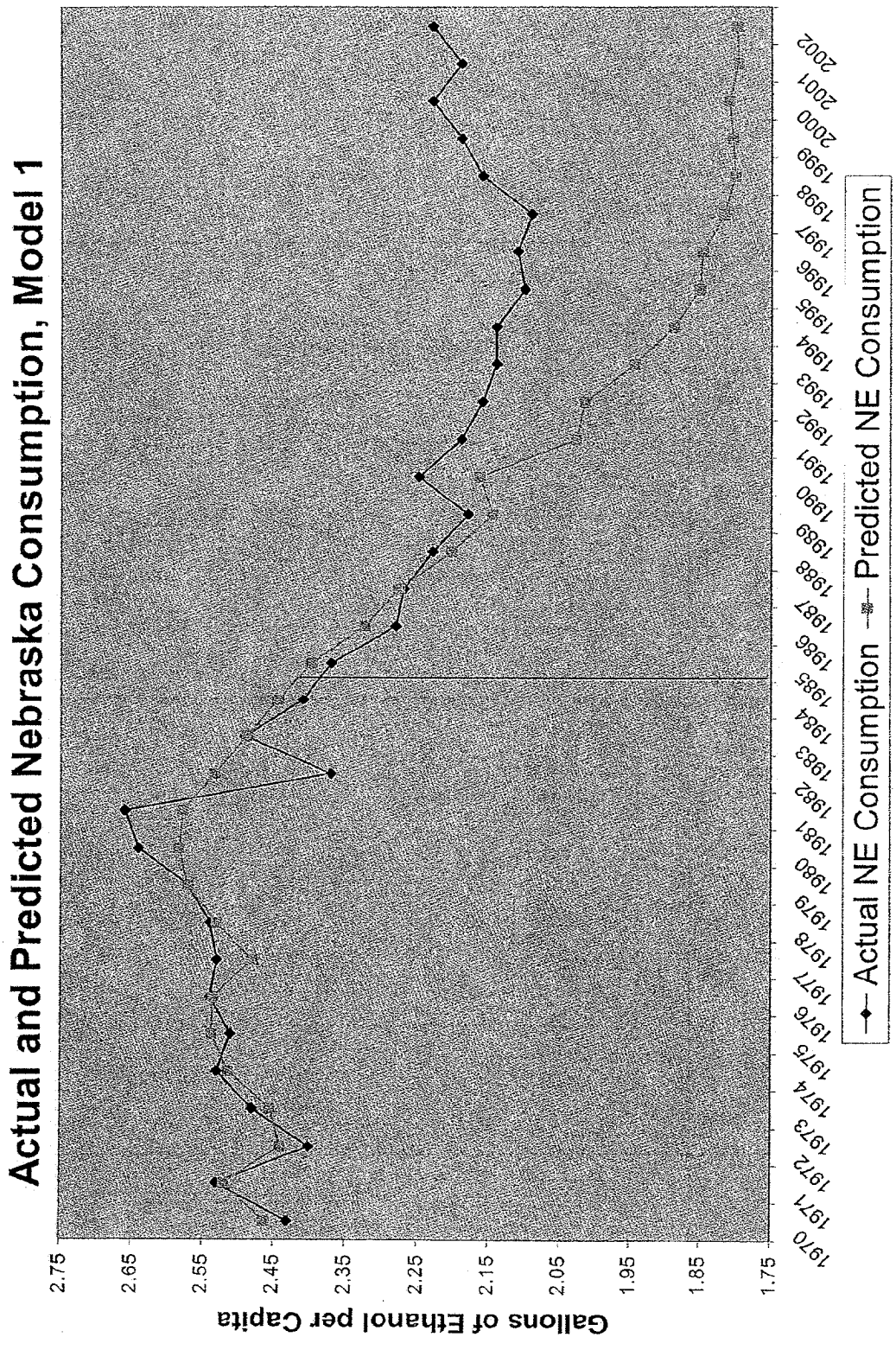

Actual and Predicted Nebraska Consumption, Model 1
Gallons of Ethanol per Capita
2.75
2.65
2.55
2.45
2.35
2.25
2.15
2.05
1.95
1.85
1.75
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Actual NE Consumption
Predicted NE Consumption

Figure 10

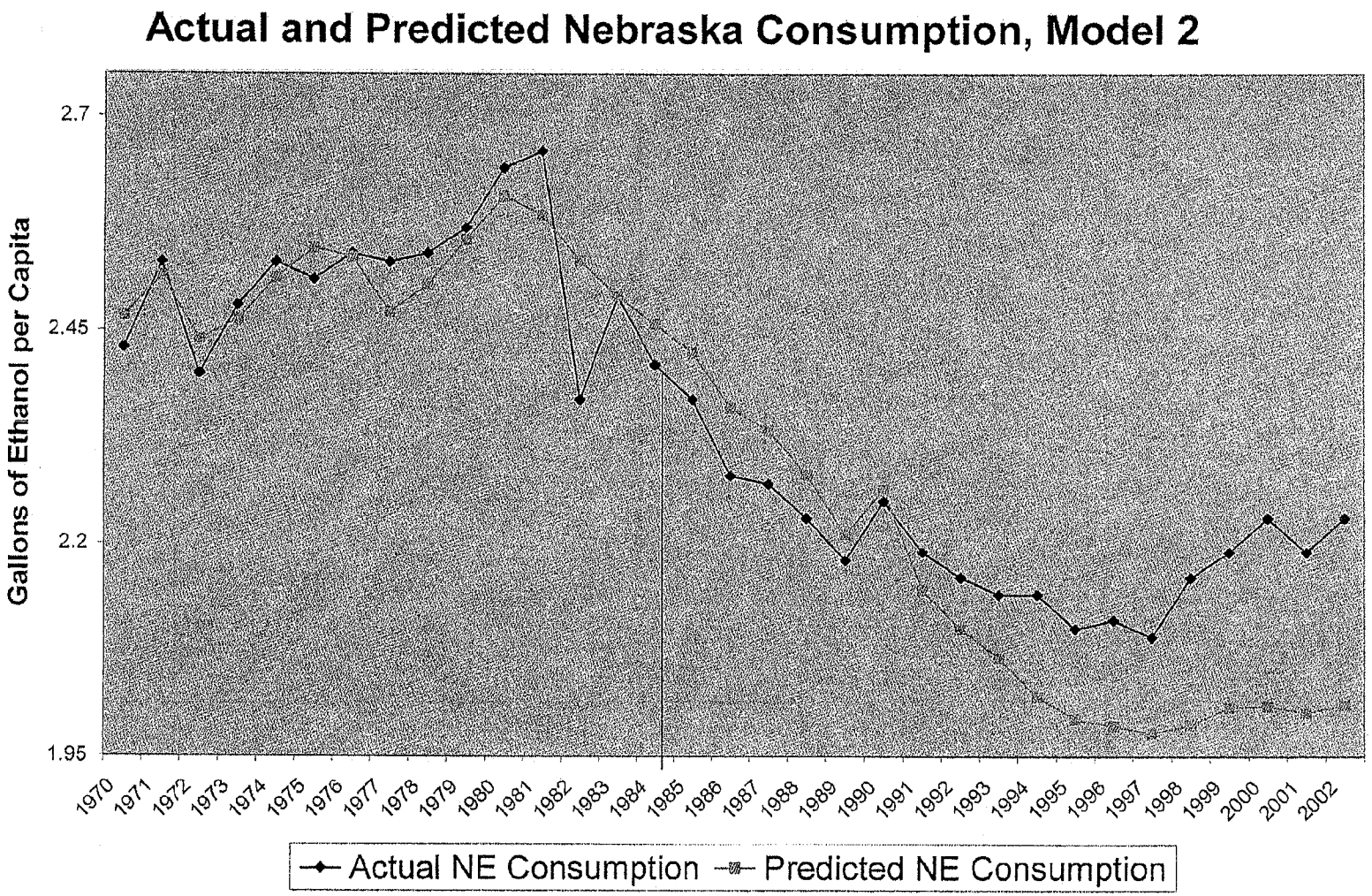


Figure 11

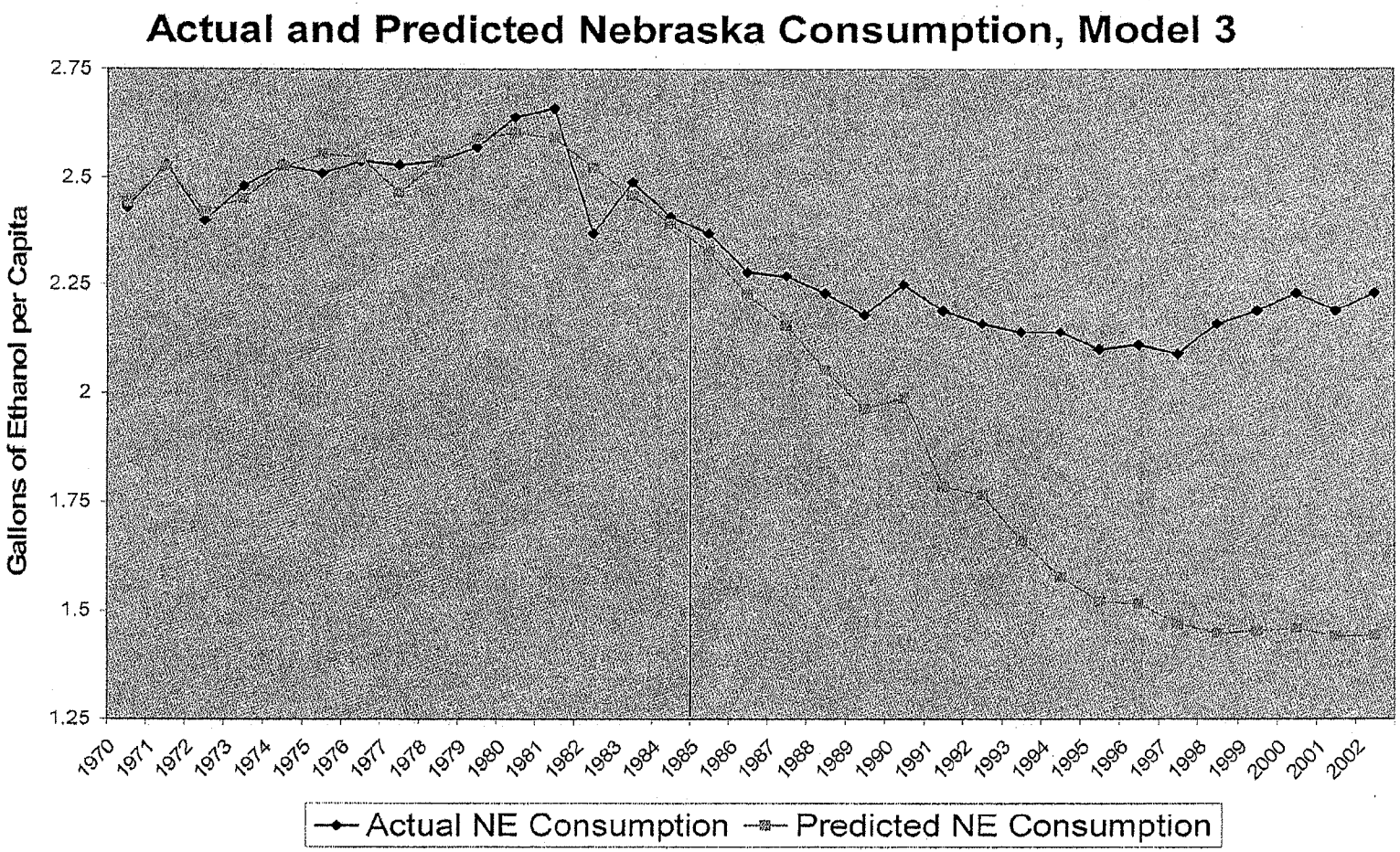


Figure 12

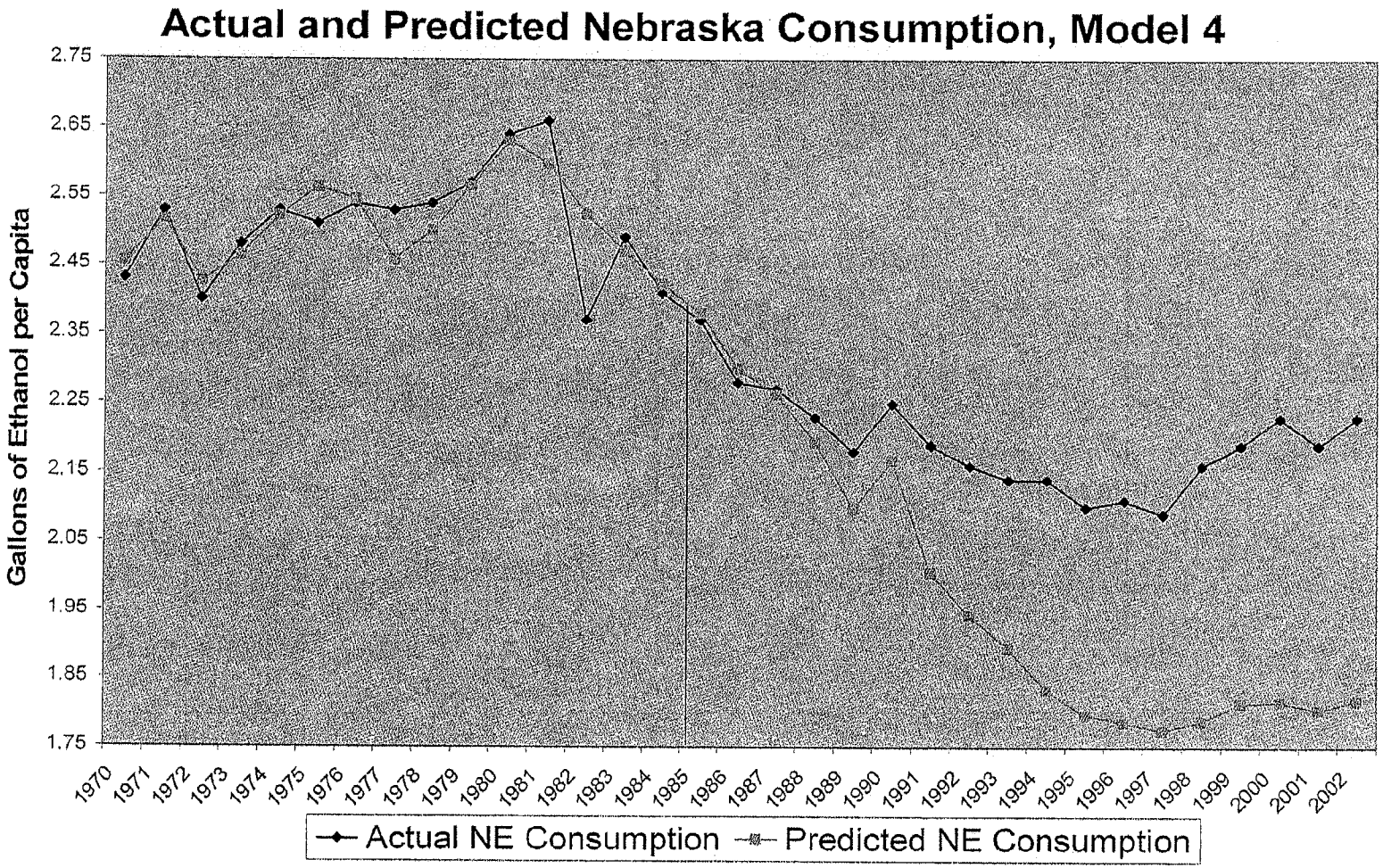


Table2
Delaware Estimates

| Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| Trend | -0.023<br>(0.011) | -0.027<br>(0.007) | -0.031<br>(0.012) | -0.032<br>(0.008) |
| US Consumption | 0.295<br>(0.313) | | -0.177<br>(0.340) | |
| Southern Consumption | | -0.144<br>(3.211) | | -0.305<br>(0.272) |
| Alcohol Tax | -8.812<br>(3.594) | -10.308<br>(3.211) | -11.396<br>(3.990) | -12.541<br>(3.347) |
| Policy Indicator | -1.001<br>(0.317) | -1.010<br>(0.299) | -4.459<br>(2.503) | -5.431<br>(2.540) |
| Policy * Trend | 0.040<br>(0.011) | 0.040<br>(0.011) | 0.045<br>(0.012) | 0.045<br>(0.010) |
| Policy * US Consumption | | | 1.529<br>(1.098) | |
| Policy * Southern Consumption | | | | 2.007<br>(1.145) |
| Constant | 3.600<br>(1.043) | 4.107<br>(0.798) | 4.319<br>(1.148) | 4.641<br>(0.827) |
| F – Joint Significance of Policy Variables<br>(p-value in parentheses) | 6.77<br>(0.004) | 7.42<br>(0.003) | 5.32<br>(0.005) | 6.35<br>(0.002) |
| F | 13.66 | 13.86 | 12.10 | 12.95 |
| $R^2$ | 0.717 | 0.720 | 0.736 | 0.749 |
| Actual Consumption, 2002<br>(gallons of ethanol) | 3.01 | 3.01 | 3.01 | 3.01 |
| Predicted Consumption, 2002<br>(gallons of ethanol) | 2.64 | 2.64 | 2.59 | 2.60 |
| Difference<br>(gallons of ethanol) | 0.37<br>(0.142) | 0.37<br>(0.139) | 0.42<br>(0.145) | 0.41<br>(0.136) |

Note: Standard errors in parentheses.

Figure 13

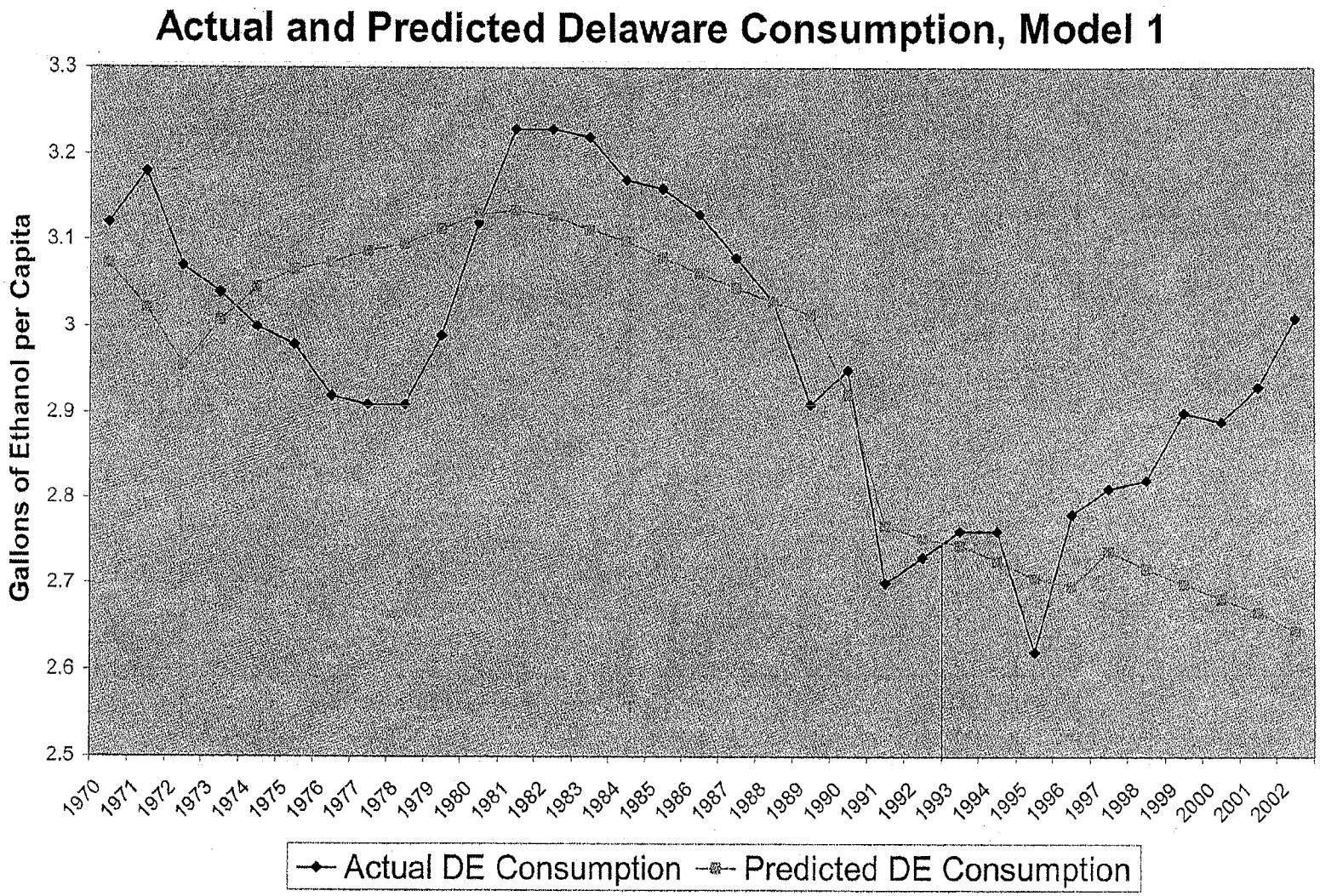


Figure 14

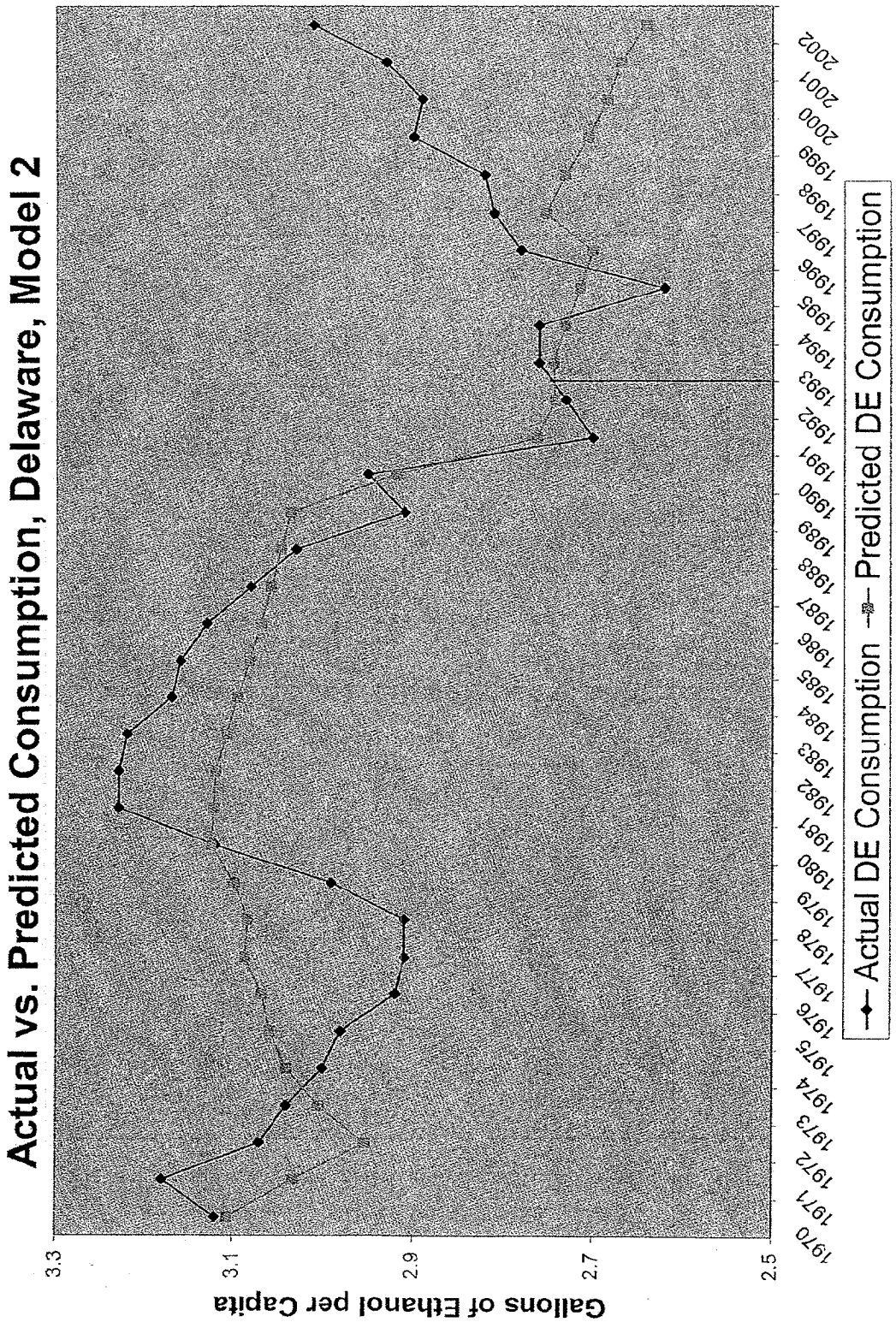

Actual vs. Predicted Consumption, Delaware, Model 2
Gallons of Ethanol per Capita
3.3
3.1
2.9
2.7
2.5
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Actual DE Consumption
Predicted DE Consumption

Figure 15

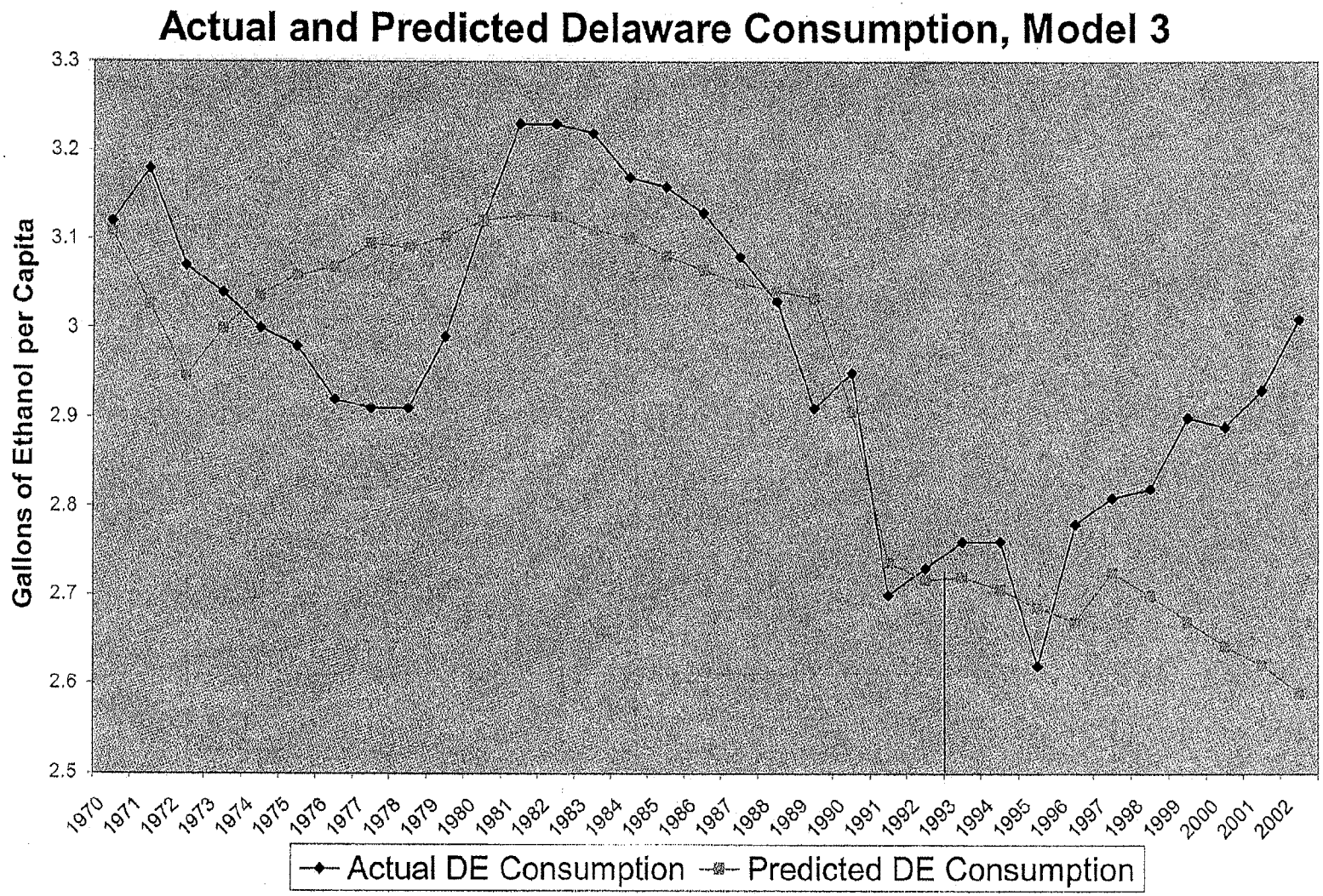
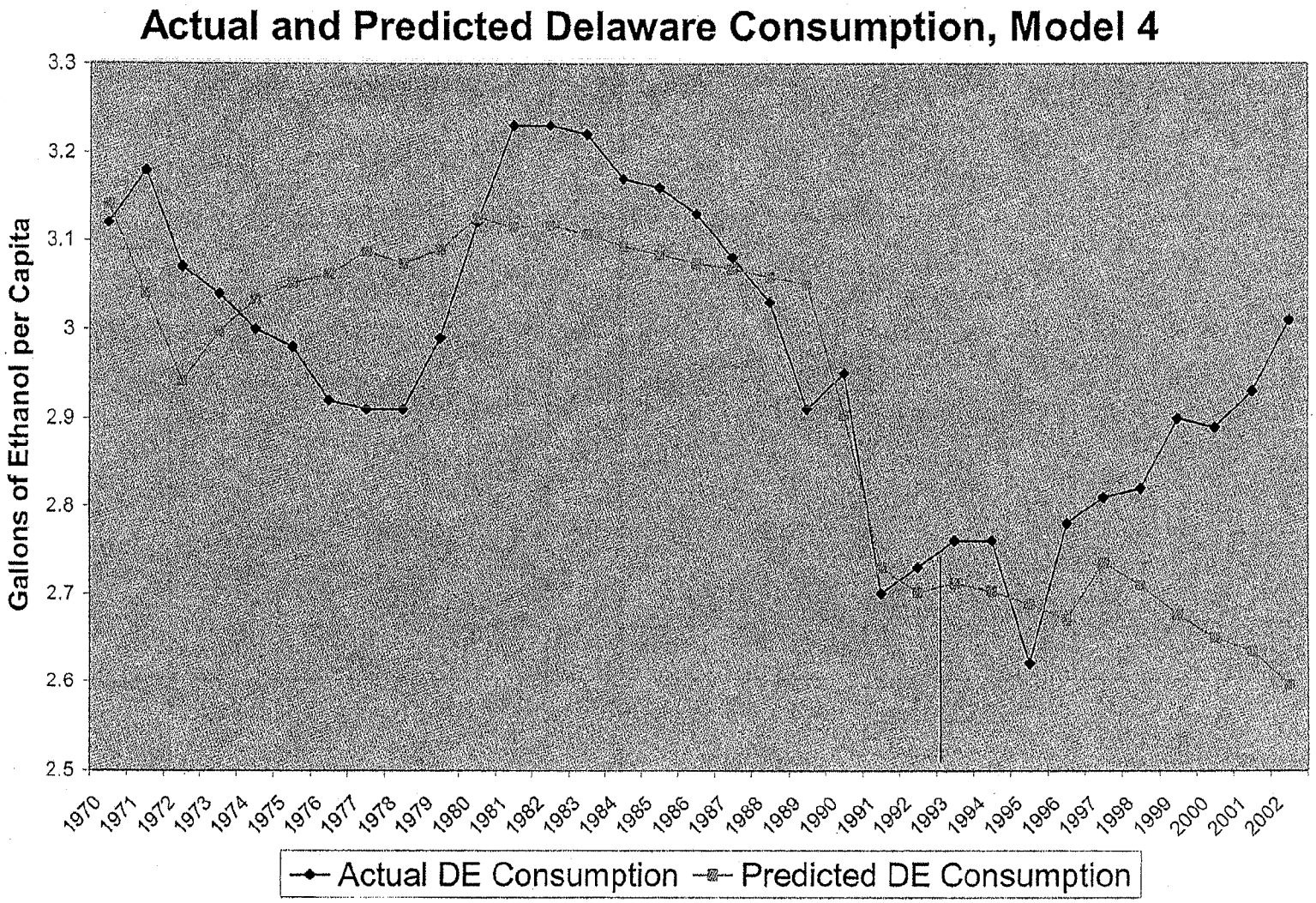


Figure 16



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Costco letter to Washington Attorney General's Office: Letter from David J. Burman, Perkins Cole, to Tina E. Kondo, Office of the Attorney General, Antitrust Division, dated August 29, 2003.

Costco complaint/related materials: Costco Wholesale Corporation, a Washington corporation, Plaintiff, v. Norm Maleng, in his official capacity as King County Prosecuting Attorney, et al., Defendants; No. CV04-0360P. Materials include: Complaint; Defendant Washington Beer and Wine Wholesalers Association's Initial Disclosures; Plaintiff Costco's Rules 26(a)(1) Initial Disclosures; and Defendants Roger Hoen, Vera Ing, and Merritt Long's Initial Disclosures.

Costco wine prices: http://www.costco.com/Common/CategoryMain.aspx?cat=3605.

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